Name

Department
Chemistry & Biochemistry

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Bush Bldg Room 110

Student Hours

Zoom Appointments are most convenient during these times:
MWF 1-2 = Meeting ID: 993 2061 1537
Invite code: https://sfasu.zoom.us/j/99320611537?pwd=aWJrUnl0dGxxY3JZNzVvMy9vRXM4Zz09
TTh 8-9 = Meeting ID: 941 9852 9037
Invite code: https://sfasu.zoom.us/j/94198529037?pwd=YjdybXZXSXo1RmM5RnExT2dyTy93dz09
(Email your intention to attend so I can look for your online arrival.)
Other Zoom Appointments by email request.
F2F questions need to be taken care of during assigned 20 minutes.

COURSE DESCRIPTION:
Conceptual Chemistry is an introductory course for non-science majors.
CHE 1371 is an overview of the field of chemistry and its impact on science, technology, society, and environment. This conceptual approach involves a minimum of mathematics and investigates the chemistry found in the world around us that impacts you and your immediate and extended environment. This course utilizes an integrated lecture/lab format. Lab fee required.

The course is organized to investigate chemistry within the body, in the home, and in the community (social and industrial).

TEXT AND MATERIALS: YOU WILL NEED A LAB BOX. INFORMATION WILL BE GIVEN IN THE ANNOUNCEMENTS. THERE IS NO ACCOMPANYING TEXTBOOK OR LAB MANUAL TO PURCHASE SEPARATELY.

GRADING POLICY:
Each topic is weighted. Within each topic, the individual assignments are worth equal weight.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Dropbox Assignments</td>
<td>15%</td>
</tr>
<tr>
<td>Discussion Posts</td>
<td>15%</td>
</tr>
<tr>
<td>Labs</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Exams</td>
<td>20%</td>
</tr>
</tbody>
</table>

(Some discussions will be categorized under ‘Lab’)

1
In CHE1371 online students have significant weekly reading and assignments involving critical thinking and quantitative reasoning for lecture and lab. Students are tested over the material via quizzes and several exams during the semester including a comprehensive final exam. Students have required academic components and deliverables: written work, discussion posts, and lab reports.

**ONLINE EXPECTATIONS:**
Always maintain a professional dialogue with your online peers when writing discussion posts and emails.

**ACADEMIC INTEGRITY (A-9.1):**
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at academic dishonesty policy

**Any student found cheating will be subject to the penalties as stated in the Student Code of Conduct handbook; including but not limited to a score of zero on exam, expulsion from the class or expulsion from the University.**

**WITHHELD GRADES SEMESTER GRADES POLICY (A-54):**
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

**STUDENTS WITH DISABILITIES:**
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

**Behavior Policy:**

*Acceptable Student Behavior:* Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed. To read the entire code of conduct, click here: http://www.sfasu.edu/policies/student-code-of-conduct-10.4.pdf

**CORE OBJECTIVES AND RESOURCES**

General Education Core Curriculum Objectives: The Texas Higher Education Coordinating Board has identified six core learning objectives: Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills, Teamwork, Personal Responsibility, and Social Responsibility. SFA is committed to the improvement of its general education core curriculum by regular assessment of student performance on these six objectives. Although this chemistry course develops the first four core-learning objectives, it only submits assessment assignments to the University Core Assessment Committee every even Spring for the Teamwork general education core curriculum requirement. If this is an even spring semester, another, “shell” course has been created to collect student artifacts to meet this state requirement. You will see this course on your D2L list.

During the even spring semester, you will receive an assignment in the laboratory portion of the course that fulfills both the requirements of the lab and the needs of Stephen F. Austin State University’s Core Curriculum Assessment Plan with the Texas Higher Education Coordinating Board. When you complete this one assignment, you need to upload the assignment to both the Chemistry dropbox and the Teamwork dropbox. Please note that this only applies to the specific teamwork assignment given in the lab section of this course. All other assignments should be submitted according to regular class operations. If you have any questions, please see your instructor or contact the University Assessment Specialist at (936) 468-1267 or jstringfield@sfasu.edu.

Below is a description of each Core Objective, followed by a chart that shows the topics covered in this course with their corresponding core objectives.

*Core Objective 1: Critical Thinking:* to include creative thinking, innovation, inquiry and analysis, evaluation and synthesis of information.

Definition of **CRITICAL THINKING:** disciplined thinking that is clear, rational, open-minded, and informed by evidence.
**Critical thinking** involves the use of a group of interconnected skills. The skills needed can be broken down into six steps.

### Six Steps of CRITICAL THINKING

1. **Knowledge** means a student must have basic knowledge about the subject.

2. **Comprehension** requires understanding of the subject. Students that comprehend the new knowledge are able to relate the new knowledge to what they already know. Comprehending goes beyond simply parroting material back.

3. **Application** requires both knowledge and comprehension. Students must be able to carry out a task or apply their knowledge and comprehension to an assigned task.

4. **Analysis** involves breaking the knowledge down into smaller parts so it become clear how the smaller parts are related to other ideas.

5. **Synthesis** involves the ability to put together the parts you analyzed with other information to create something original.

6. **Evaluation** occurs once we have understood and analyzed what is said or written and the reasons offered to support it. Then we can appraise this information in order to decide whether you can give or withhold belief, and whether or not to take a particular action.

Adapted from: [http://www.mhhe.com/socsicence/philosophy/reichenbach/m1_chap02studyguide.html](http://www.mhhe.com/socsicence/philosophy/reichenbach/m1_chap02studyguide.html) (accessed May 23, 2013)

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**Core Objective 2: Communication Skills: to include effective development, interpretation and expression of ideas through written, oral, and visual communication.**

### COMMUNICATION SKILLS in the sciences

For an excellent resource in scientific communication from a highly reputable source see the information provided on the Nature website link shown below.

[http://www.nature.com/scitable/topic/scientific-communication-14121566](http://www.nature.com/scitable/topic/scientific-communication-14121566) (accessed May 31, 2013)

Three especially informative links within the link shown above are:

- Effective Communication
- Effective Writing
- Audience/Purpose
Core Objective 3: Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

EMPIRICAL AND QUANTITATIVE SKILLS

Chemists rely on observations to explain the nature of the substances they study. There are two types of observations exist: qualitative and quantitative. A qualitative observation is an observation made with the senses and is usually expressed using words instead of numbers. Qualitative observations about a person sick in the hospital might include that the person is breathing rapidly, has a high temperature, and is very thin.

A quantitative observation is an observation that requires a numerical measurement and describes something in terms of "how much". The quantitative observation that a person has a temperature of 103.6 °F is much more useful information than just knowing that the person has a fever. Quantitative observations are preferred by scientists. Often quantitative data is acquired in lab. One or more measurement is always a part of any quantitative observation. A measurement determines the dimensions, capacity, quantity, or extent of something. The most common types of measurements made in chemical laboratories are those of mass, volume, length, temperature, pressure, and concentration. Measurements always consist of two parts: a number, which tells the amount of the quantity measured, and a unit, which tells the nature or kind of quantity measured. A measured number without a unit is meaningless.

Once quantitative data is obtained, chemists then mathematically manipulate and analyze data.

Adapted from saplinglearning.com; accessed May 31, 2013

Core Objective 4: Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

Definition of TEAMWORK: work done by several associates with each doing a part but all subordinating personal prominence to the efficiency of the whole.


TEAMWORK General Rules

Each team member needs:

- all ideas evaluated critically;
- treat others in the group with respect
- everyone needs to pull their weight, meet deadlines, and contribute equally;
- actions need to be followed through;
- reporting needs to be accurate and comprehensive;
- problems with under-performing team members need to be discussed openly and resolved quickly; and
- peer assessment should be given fairly

Summary:

| Core Objective 1: | To include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information. |
Critical Thinking Skills

Core Objective 2: Communication Skills
To include effective development, interpretation and expression of ideas though written, oral, and visual communication.

Core Objective 3: Empirical and Quantitative Skills
To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

Core Objective 4: Teamwork
To include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

This Core Objective is Strongly in the School Improvement Activity

Student Learning Outcomes: Upon completion of this course, the students are expected to

- apply chemistry concepts using critical thinking skills and the scientific method to analyze and evaluate information to reach conclusions within problem sets and lab experiments. (COs 1 & 3)
- use communication skills to demonstrate their interpretation and analysis of scientific data. (CO 2)
- apply logic, quantitative reasoning, and pattern recognition to analyze and evaluate numerical data/observable facts to reach conclusions within problem sets and lab experiments. (COs 1 & 3)
- demonstrate the ability to cooperate within groups to gather results of an experiment, analyze data, and draw conclusions using communication skills. (COs 2 & 4)

How Laboratories meet the Core Objectives:

<table>
<thead>
<tr>
<th>Core Objective 1: Critical Thinking Skills</th>
<th>Every lab will require a collection of data in which you must analyze the information. Each lab has objectives that are achieved by manipulating chemicals and equipment which involves inquiry skills.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Objective 2: Communication Skills</td>
<td>Communication with your lab partner is absolutely essential in order to perform the experiment, take data, and analyze the results.</td>
</tr>
<tr>
<td>Core Objective 3: Empirical and Quantitative Skills</td>
<td>Each lab will include the manipulation and analysis of numerical data or observable facts from which an informed conclusion will be drawn.</td>
</tr>
<tr>
<td>Core Objective 4: Teamwork</td>
<td>When working with a partner in a lab setting, it is important to work as a team, considering different points of view and working effectively to meet the objectives set forth in the lab manual. This Core Objective is Strongly Emphasized in Lab.</td>
</tr>
</tbody>
</table>

Course Topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Core Objective</th>
<th>Specifics…</th>
</tr>
</thead>
</table>

6
<table>
<thead>
<tr>
<th>Definition of Chemistry</th>
<th>Core Objective 1: Critical Thinking Skills</th>
<th>Analyzing and Interpreting data from a scientific investigation. Inquire about the natural world.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Method/Processes</td>
<td>Core Objective 3: Empirical and Quantitative Skills</td>
<td>In problem solving, learn to apply significant figures and apply the terms accuracy and precision to measurements.</td>
</tr>
<tr>
<td>Measurement</td>
<td>Core Objective 2: Communication Skills</td>
<td>Identify and justify as a class classification of matter and types of changes.</td>
</tr>
<tr>
<td>Atoms and Periodic Table; Classifying Matter; Physical and Chemical Properties and Changes; Energy</td>
<td>Core Objective 4: Teamwork</td>
<td>Analyze composition of ions after gaining or losing electrons.</td>
</tr>
<tr>
<td>Parts of the Atom (subatomic particles); Ions and Isotopes</td>
<td>Core Objective 1: Critical Thinking Skills</td>
<td>Analyze and communicate with class both molecular vs. ionic compounds; construct proper formulas and discuss and justify names of compounds.</td>
</tr>
<tr>
<td>Writing and Naming Chemical Compounds</td>
<td>Core Objective 2: Communication Skills</td>
<td>Identify type of reaction; analyze reactants and determine products; balance reactions</td>
</tr>
<tr>
<td>Types of Reactions</td>
<td>All Core Objectives</td>
<td>Use visual communication to illustrate electron placement in electron configurations and molecular orbital diagrams. Analyze stability of an atom.</td>
</tr>
<tr>
<td>Electromagnetic Spectrum; Emission Spectra; Models that Explain Light Emission and Atomic Structure.</td>
<td>Core Objective 2: Communication Skills</td>
<td>Analyze and construct a 3-D model of a molecule given valence electrons. Determine the overall polarity of molecules by evaluating polar bonds within the molecule.</td>
</tr>
<tr>
<td>Lewis Dot Structures and 3-D Molecular Geometry of Molecules. Lewis Dot Structures of Ionic Solids, Polarity.</td>
<td>Core Objective 1: Critical Thinking Skills</td>
<td>Communicate the effect on a gas when either volume, pressure, or temperature of a gas is changed.</td>
</tr>
<tr>
<td>Gas Behavior Given Various Conditions and Changes.</td>
<td>Core Objective 1: Critical Thinking Skills; Core Objective 2: Communication Skills Core Objective 3: Empirical and Quantitative Skills</td>
<td>Communicate how intermolecular forces determine state of matter, volatility, and viscosity.</td>
</tr>
<tr>
<td>Intermolecular Forces</td>
<td>Core Objectives 1-3</td>
<td>Analyze how solute particles affect vapor pressure, melting point, boiling point, and osmotic property.</td>
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<tr>
<td>Solution Concentration, Types of Solutions, and Colligative Properties</td>
<td>All Core Objectives</td>
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</table>
pressure. Discuss the effect of hyper-, hypo- and isosmotic solutions on cells.

Acid and Base Definitions and Properties
Core Objective 1: Critical Thinking Skills; Core Objective 3: Empirical and Quantitative Skills
Identify acid and base properties. Calculate pH.

Nuclear Chemistry
Core Objective 2: Communication Skills
Learn the types of radioactive decay; be able to finish an equation with a decay element.

Fall 2020 Calendar (Due Dates)

CHE1371 Course Calendar: All due date times are 11:30 pm.

Fall 2020 First 8 weeks session

<table>
<thead>
<tr>
<th>Week of</th>
<th>Module Name</th>
<th>Lessons/Labs/Dropbox Assign./Discussions/Quizzes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 24</td>
<td>Syllabus and Course Introduction to Conceptual Chemistry</td>
<td>Introduction to Conceptual Chemistry Course Syllabus Course Calendar Lab Box Contents Assignment: Honor Statement (due by Aug 24)</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Notes</td>
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<tr>
<td>Aug 29-31</td>
<td>Basic Chemistry Principles Pt. 2</td>
<td>Reactivity Introduction and Objectives</td>
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<td>Group Number = Valence Electrons</td>
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<td>Everyone wants to be Nobility</td>
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<td>Basic Organization of the Periodic Table</td>
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<td>Characteristics of Some Important Groups</td>
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<td>Ionic Bonds</td>
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<td>Covalent Bonds</td>
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<td>Between Black and White is Gray</td>
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<td>Aug 31</td>
<td>Quiz 4 available; you have one week.</td>
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<td>Quiz 4 - Element Symbol Quiz;</td>
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<td>Naming &amp; Writing Formulas</td>
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<td>Sept 1-5</td>
<td>Measurements in Science</td>
<td>Measurement Introduction and Objectives</td>
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<td>Precision vs. Accuracy</td>
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<td></td>
<td>How Far do you take a Measurement?</td>
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<td>Significant Figure Practice</td>
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<td>Sig Fig Answers + Some New Rules</td>
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<td>Math Answers &amp; Unlimited Sig figs</td>
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<td>Scientific Notation</td>
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<td>Scientific Notation Answers</td>
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<td>Converting with Length</td>
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<td>Measuring Mass</td>
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<td>Lab: Four White Solids of Unknown Molar Mass (due Sept.3)</td>
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<td>Volume</td>
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<td>Three Temperature Scales</td>
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<td>Lab: Water Cooling Curve: A Graphing Lab (due Sept.4)</td>
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<td>Pressure</td>
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<td>Worksheet: Conversion (Due Sept 5)</td>
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<td>Discussion: To Convert or Not to Convert (due Sept 5)</td>
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<td>Quiz 3 Measurement (due Sept 5)</td>
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<td>Checklist and Conclusion</td>
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<td>Turn in 1 page of Notes to Dropbox</td>
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<tr>
<td>Sept 5</td>
<td>Exam I available</td>
<td>Due Sept 12 (1 week)</td>
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</tbody>
</table>
| Sept 6-8 | Chemistry in the Body Pt. 1 | Introduction and Objectives  
Intramolecular Bonds  
Intermolecular Attractions  
Solid, Liquid, or Gas?  
ATP - Adenosine triphosphate  
Ions in Your Body  
Nucleic Acids  
Proteins  
Carbohydrates  
Lipids(Fats)  
Diabetes  
Lab: Measuring Sugar in Drinks (due Sept 8)  
Quiz 5 Chemistry in the Body Pt. 1 (due Sept 8)  
Checklist and Conclusion  
Turn in 1 page of Notes to Dropbox |
| Sept 6 | Quiz 4 Deadline | |
| Sept 9-14 | Chemistry in the Body Pt. 2 | Introduction and Objectives  
Lewis Dot Structure of Atoms  
Lewis Dot Structures of Molecules  
VSEPR Theory Helps Determine Shape  
Polar and Nonpolar: Crossing Cell Membranes  
Lab: Lewis Dot Structures and Molecular Geometry (Sept 11)  
Lewis Dot Structures of Ionic Compounds  
Discussion: Free Radicals (Sept 12)  
Enzymes and Inhibitors  
Assignment: Cell Membrane Receptors - Insulin and Diabetes (Sept 13)  
Caffeine  
Artificial Sweeteners  
The Caffeine + Sugar Combination  
A Protease Inhibitor - Indinavir  
Our Immune System  
Penicillin  
Xenoestrogens  
Quiz 6 Chemistry in the Body Pt. 2 (June 14)  
Checklist and Conclusion  
Turn in 1 page of Notes to Dropbox |
| Sept 12 | Exam I Due | *ALL PREVIOUS ASSIGNMENTS DUE |
| Sept 15-19 | Chemistry in the Home Pt. 1 | Introduction and Objectives  
Harmful Chemicals Used in Making our Products 
Types of Reactions: Combustion, Synthesis, and Decomposition 
Types of Reactions: Single Replacement 
Lab: Copper Plating (Sept 16) 
Types of Reactions: Double Replacement 
Law of Conservation of Mass 
Answers to Balancing Equations 
**Assignment: Balancing Equations (Sept 17)**  
Definition and Types of Energy 
Endothermic Reactions 
Exothermic Reactions 
Your Refrigerator 
Specific Heat Capacity 
Water's Specific Heat Capacity 
Lab: Food Calorimetry (Sept 18) 
Soap vs. Laundry Detergent 
Cleaning the Washing Machine 
The Dryer Didn't Shrink your Clothes 
Halogens, Group VIIA on the Periodic Table 
The Medicine Cabinet 
Under the Sink 
Radon Gas: Caution 
**Quiz 7: Chemistry in the Home Pt. 1 (Sept 19)**  
Checklist and Conclusion  
Turn in 1 page of Notes to Dropbox |
| --- | --- | --- |
| Sept 20-22 | Chemistry in the Home Pt. 2 | Introduction and Objectives 
Concentration 
Your Car Battery 
Acids 
Bases 
Lab: Testing pH (Sept 20) 
Buffers 
Colligative Properties 
Lab: Boiling Point Elevation (Sept 21) 
Kinetic Molecular Theory 
The Bases in Your Car 
Pressure, Volume, and Temperature: Two More Laws 
Dangerous Gases 
Fertilizers 
Pesticides 
Herbicides 
**Quiz 8 Chemistry in the Home Pt. 2 (Sept 22)**  
Checklist and Conclusion  
Turn in 1 page of Notes to Dropbox |
<p>| Sept 22 | Exam II Available | Due on Sept 29 (1 week) |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Section</th>
<th>Topics</th>
</tr>
</thead>
</table>
| Sept 23-28 | Chemistry in the Community Pt. 1             | Radioactive Decay  
Radioisotopes in the Hospital  
Properties of an Electromagnetic Wave  
Radio Waves, Microwaves, and Infrared Waves  
Visible Waves  
Ultraviolet Light, X-Rays, and Gamma Rays  
Lab: UV Bead Experiment (Sept 24)  
Bullet Proof Vests  
Lab: Polymer Lab (Sept 25)  
Discussion: Polymer List (Sept 25)  
Redox Reactions and the Breathalyzer  
Tear Gas  
Pepper Spray  
Smoke Grenades  
Fingerprinting  
Lab: Super Glue Fingerprinting (Sept 26)  
Cold Light and Luminol  
Schools: Discussion (Group Sept 27-29)  
Class report and Teamwork Rubric (Sept 30)  
Quiz 9 Chemistry in the Community Pt. 1 (Sept 30)  
Checklist and Conclusion  
Turn in 1 page of Notes to Dropbox |
| Sept 29    | Exam II Due                                  |                                                                        |
| Oct 1-3    | Chemistry in the Community Pt. 2             | Introduction and Objectives  
The Fire Triangle  
Special Circumstances of Fire  
Fire Extinguishers  
Flame Retardants  
Personal Protective Equipment  
The Plastic Pollution Problem  
Discussion: Three Facts about Plastic Garbage (Oct 2)  
The Types of Plastics  
Recycling Plastics  
Paper and Glass  
The Non-Recyclables  
Quiz 10 Chemistry in the Community Pt. 2 (Oct 3)  
Checklist and Conclusion  
Turn in 1 page of Notes to Dropbox |
| Oct 6      | Exam III Available                           | Due Oct 13                                                             |
| Oct 6      | Exam III Available                           | Due Oct 13                                                             |
| Oct 4-6 | Global Chemistry | Introduction and Objectives  
Air Pollution  
Controlling Air Pollution  
Ozone  
Discussion: Indoor Air Pollution (due Oct 5)  
Too Much Carbon Dioxide  
What Constitutes a Greenhouse Gas?  
What’s Happening to our Earth?  
Discussion: Climate Change Action / Inaction (due Oct 6)  
Quiz 11 Global Chemistry (due Oct 6)  
Checklist and Conclusion |
|---|---|---|
| Oct 7 | Alternative Energy | Introduction and Objectives  
Solar Power  
Wind Power  
Water Power  
Biomass Energy  
Nuclear Chemistry  
Nuclear Energy  
Quiz 12 Alternative Energy (due Oct 9)  
Checklist and Conclusion |
| Oct 10-12 | Innovations | Introduction and Objectives  
Burning Fossil Fuels  
How Batteries Work: Redox Reactions  
Solar Powered Cars  
Electric Cars with Lithium Batteries  
Hydrogen Fuel Cell Automobiles  
Electric Cars-Ionic Fluid  
Other Innovations to Make a Car more Efficient  
From the Animal Kingdom  
From the Plant Kingdom  
From the Earth  
The Possible Impacts of Cell Phones  
Quiz 13 Innovations (due Oct 12)  
Checklist and Conclusions  
Turn in 1 page of Notes to Dropbox |
| Oct 13  
Oct 14 | Final Exam Due  
All Makeup Quizzes Due |  
