General Chemistry
Introduction and Syllabus

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Extra Help:	By Appointment

Welcome to chemistry class! Chemistry is the branch of science that is concerned with matter and the changes it undergoes. I look forward to an exciting year of learning and hope that I can assist you in attaining the highest grade possible in this class.

What you can expect from me

I will make every effort to

- Come to class every day with a lesson prepared
- Be fair and consistent in how I deal with all students
- Return graded assignments in a timely manner
- Explain the course material as clearly as possible

My goals for this course:

- I want every student to come to class every day
- I want every student to understand the material and, if possible, enjoy class
- I want every student to make an "A" or "B"
- I want every student to feel prepared to take college-level chemistry after completing this course.

What I expect from you

I expect you to make every effort to

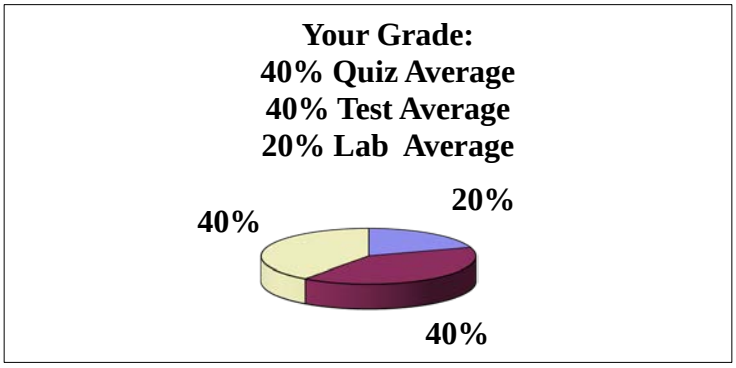
- Come to class every day on time
- Prepare for chemistry outside of class by doing the assigned homework
- Push yourself to learn as much as possible

What you can expect from this course

Most of you have, at a minimum, already taken (or are taking) Biology and Geometry. Some people find chemistry to be more difficult than biology because chemistry requires a lot more problem-solving than biology does. However, some people find that chemistry is a lot easier for this same reason. Expect a lot less vocabulary and memorization than in biology, and expect a lot more mathematical problems. If you have taken algebra, you have more than enough math for 95% of this course. The math in chemistry is not hard; it is very low-level arithmetic for the most part. However, even though the math in this class is generally easy, there is a lot of it.

Grading scheme

Your class average in chemistry will be determined as follows:



On average, there will be one or two quizzes and one lab per week. There will be a test roughly every other week.

Grading Scale:

- A: 90 – 100%
- B: 80 – 89%
- C: 70 – 79%
- D: 60 – 69%
- F: Below 60%

Make-up work and other grading policies

- **Homework** is not usually collected. (The quizzes come right from the HW, so it's usually pretty obvious whether or not you understood the previous night's assigned problems.) You are expected to do the HW on your own, whether or not you are here. You are responsible for any changes in the HW assignments that were announced while you were gone.

- **Labs** that are missed due to an absence of any kind cannot be made up. Unexcused absences will therefore result in a grade of zero. Excused absences will be "omit" grades that neither help nor hurt the student's class average. (Missing labs for any reason will put you at a great disadvantage in preparing for tests.) If you are absent on the due date of a lab report, make sure that you turn it in as soon as you get back! I will not remember that you were not here to turn it in!

- **Quizzes** that are missed cannot be made up after I have handed back the graded assignment to the rest of the class. Excused and unexcused absences (and tardies) will result in a grade of zero. The lowest two quizzes will be dropped for all students at the end of each term. (Only quizzes can be dropped – tests and labs are never dropped.) Thus, a student who has missed two quizzes can still theoretically achieve a quiz average of 100%. Obviously, students who come to class have a big advantage over students who miss class and/or who are frequently tardy to class.

- **Tests:** If you miss a test, you will need to make it up as soon as possible after you return. Obviously, it is your responsibility to set up a time with me to take the make-up test. (I will probably not remember that you missed it.)

- There will not be any "extra" projects or papers assigned this semester. We have plenty to do without them, believe me! ☺

Materials that you will need

- **Loose leaf notebook** with pockets and/or folders. This is your notebook; it will never be collected. Just make sure that it can hold plenty of odd-shaped handouts.
- **Pens, pencils, lots of filler paper, and a scientific calculator**. Graphing calculators are fine, but not necessary. You should be able to get a scientific calculator for 10 or 20 dollars. Necessary functions: memory, logarithm ("log"), scientific notation, and exponents. *Bring your calculator every day.*
- Your **textbook**. (Please cover it.)
- Long pants, closed-toe shoes, and a hair band (if you have long hair) for lab days.

Final thoughts and tips

- I am looking forward to a great semester, and I hope you are, too. Please just do me (and you!) this favor: keep up with the work and come to class. This will make life easier for you and for me.
- If you find that you're having trouble understanding something, see me sooner rather than later. Most of the time, students taking chemistry know a lot more than they realize; they may think they are totally clueless, but in fact are actually quite close to understanding how to do a certain type of problem that seems "impossible."
- Don't concentrate on reading the book if you find it boring. (However, if you happen to be a good text-reader, this is also an excellent way to learn.) Work the problems. If you can solve the HW problems, then you are ready for the test.
- Get a study group – it's usually a lot faster and a lot more fun to learn from a fellow student than it is to learn from a teacher. However, if there's anything I can do to help, I'll be glad to give you a hand.
- Never cheat. I'll lose respect for you, and so will everyone else. It's not worth it.

Good luck!

Chemistry Tests and Quizzes

CHAPTERS	TESTS	QUIZZES	OBJECTIVES
1		1. Chemistry and Scientific Notation 2. Measurement	
5	Chs. 1 & 5	3. Dimensional Analysis I 4. Dimensional Analysis II	
2		5. Properties and Classification of Matter 6. Energy and Energy Changes	2.2.2 2.1.4
3	Chs. 2 & 3	7. Development of the Atomic Model 8. Atomic Calculations 9. Introduction to the Periodic Table	1.1.1,1.1.2, 1.1.3 1.1.1 1.3.1
11		10. Quantum Theory & Light 11. Electron Config's. & Aufbau Diagrams 12. Periodic Trends	1.1.2, 1.1.3 1.1.2 1.3.2, 1.3.3
12	Chs. 11 & 12	13. Types of Bonding 14. Lewis Dot Structures 15. Molecular Geometry & Polarity	1.2.1, 1.2.2, 1.2.5 1.2.2, 1.2.4 1.2.5
4		16. Ionic Nomenclature 17. Ionic and Covalent Nomenclature	1.2.4 1.2.4
6	Chs. 4 & 6	18. Molar Calculations 19. Empirical and Molecular Formulas	2.2.5 2.2.5
7 & 8		20. Types of Chemical Reactions 21. Writing & Balancing Chemical Equations 22. Solubility, Precipitates, & Rxn. Prediction	2.2.3 2.2.3 2.2.3
9	Chs. 7, 8, & 9	23. Stoichiometry I 24. Stoichiometry II	2.2.4 2.2.4
Midterm Exam: Chapters 1-9, 11, & 12			
13	Ch. 13	25. Gas Laws I 26. Gas Laws II 27. Gas Stoichiometry	2.1.5 2.1.5, 2.2.4 2.1.5, 2.2.4
14	Ch. 14	28. Phase Diagrams 29. Heating & Cooling Curves	1.2.3, 2.1.1, 2.1.3 1.2.3, 2.1.1, 2.1.2
15	Ch. 15	30. Solutions and Other Mixtures 31. Molarity 32. Dissociation and Colligative Properties	3.2.3 3.2.3 3.2.3, 3.2.4
10	Ch. 10	33. Thermodynamic Calculations	2.2.1
17	Ch. 17	34. Kinetics 35. Chemical Equilibrium and K_{eq} 36. Le Châtelier's Principle	3.1.2, 3.1.3 3.1.2, 3.1.3 3.1.2, 3.1.3
16	Ch. 16	37. Identifying and Naming Acids and Bases 38. pH Calculations I 39. pH Calculations II	3.2.1, 3.2.2, 1.2.4 3.1.2, 3.1.3 3.1.2, 3.1.3
18		40. Redox Reactions 41. Electrochemistry	
19	Chs. 18 & 19	42. Nuclear Processes and Calculations	1.1.4
Final Exam (Chapters 1 through 19)			

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Homework Problems

CHAPTER	END-OF-CHAPTER HOMEWORK PROBLEMS* (*These problem sets are tentative and subject to change.)
1	5, 9
5	2-62 even
2	1-19 all
3	2-52 even in Ch.3, plus #1-4 all in Ch.7, p.209
11	2-56 even
12	2-52 even
4	2-50 even
6	2-54 even
7	10-30 even, 31-36 all
8	2-38 even
9	2-46 even
13	2-54 even
14	2-42 even
15	2-50 even
10	2-44 even
17	2-52 even
16	2-44 even
18	18-32 even
19	2-50 even

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Lab Curriculum

EXPERIMENT	PRIMARY OBJECTIVES	RELEVANT CHAPTER
1. Evidence of Chemical Change	2.2.2	2
2. Paper Chromatography	1.2.3	2
3. Accuracy and Precision in Measurements		5
4. Flame Tests	1.1.2, 1.1.3	3, 11
5. Molecular Models & Molecular Geometry	1.22, 1.2.4, 1.2.5	12
6. Properties of Hydrogen and Oxygen	2.2.1, 2.2.2	7, 8
7. Properties of Carbon Dioxide	2.2.2	7, 8
8. Activity Series of Metals	2.2.3	7, 8
9. Water of Crystallization and Formula of a Hydrate	2.2.1, 2.2.2, 2.2.5	6
10. Mass-Mole Relationships in a Chemical Reaction	2.2.4	9
11. Limiting & Excess Reagents	2.2.3	9
12. Boyle's Law	2.1.5	13
13. Molar Volume of a Gas	2.1.5, 2.2.4	13
14. Molar Mass of Butane	2.1.5	13
15. Specific Heat of a Metal	2.1.4	10
16. Heat of Fusion of Ice	1.2.3, 2.1.1, 2.1.2	14
17. Reacting Ionic Species In Aqueous Solution	2.2.3	15
18. Titration of a Strong Acid and a Strong Base	3.2.1, 3.2.2	16

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☺ Why "survive" chemistry? *Enjoy* it, instead! ☺

Guidelines for Success in Chemistry

1. If you're going to take chemistry, try to get an "A+."
2. Please show up on time, every day, no matter what.
3. Bring your covered textbook, notebook, calculator, and pen/pencil every day.
4. Please finish using the phone, eating, drinking, and sleeping before you get to class.
5. Don't be afraid to ask questions and participate – none of this stuff makes any sense to 98% of the class at first. Believe me.
6. Do at least a little studying every night.
7. Do every homework problem (on time if possible).
8. Look at the pictures in the textbook.
9. Treat me and your classmates with respect. Expect respect from me.
10. Keep your graded papers, keep track of your grades and absences, and examine your progress reports and report cards for errors.

Syllabus

Chapter 1 Chemistry: An Introduction

- What is science? What is chemistry?

Chapter 5 Measurements and Calculations

- Scientific notation: how can we represent very small and very big numbers?
- Why are units of measurement and prefixes important?
- How are measurements made?
- What is uncertainty? How are significant figures used?
- How are calculations performed using measurements? How is density determined?

Chapter 2 Matter and Energy

- What is matter?
- What are physical properties and physical changes? What are chemical properties and chemical changes?
- How is matter classified according to composition?
- What are energy, temperature, and heat? How are they related? What is specific heat?

Chapter 3 Chemical Foundations: Elements, Atoms, and Ions

- What are elements? What are atoms?
- What were the initial theories of matter? What is our current view of the composition of matter, the atomic theory? What evidence supports our current model of the atom?
- What are the components of an atom? What is mass number? What is atomic mass?
- What is some of the useful information that the periodic table contains?
- What is an isotope? What is an ion?

Chapter 11 Modern Atomic Theory

- What is light? What is the relationship between light and atoms?
- What evidence suggests that electrons exist in energy levels?
- What is the significance of wave-particle duality?
- What are atomic orbitals? What are the different types of atomic sublevels? What are the rules governing quantum numbers?
- How are an atom's Aufbau diagram and electron configuration related? How is electron configuration related to an atom's position on the periodic table?

Chapter 12 Chemical Bonding

- How do atoms connect with another to make compounds?
- How are covalent, ionic, and metallic bondings different from one another?
- How are molecular geometry and molecular polarity determined?

Chapter 4 Nomenclature (Sections: 5.1 - 5.5, 5.7)

- How can we give write names for compounds, given their formulas?
- How can we write formulas from the names of compounds?

Chapter 6 Chemical Composition

- When is it important for a chemist to know the mass of a chemical? When is it important for a chemist to know how many particles (atoms, molecules, etc.) there are in a given amount of a substance?
- How can we determine the mass of a substance, given the number of particles of that substance?
- How can we determine the number of particles of a substance, given the mass of that substance?
- How are empirical and molecular formulas determined from experimental data? What is the relationship between a compound's formula and its percent composition?

Chapters 7 & 8 Chemical Reactions

- How can we represent chemical reactions with chemical equations?
- How and why are chemical equations balanced?
- What are the five types of chemical reactions?
- What are the three "forces that drive" chemical reactions?

Chapter 9 Chemical Quantities

- How can chemical equations be used to determine the mass of the product that will be formed in a chemical reaction?
- What are limiting and excess reagents? How are they used in stoichiometric calculations?
- How is percent yield calculated?

Chapter 13 Gases

- What are gases? Why are some substances gases under standard conditions, while others are liquids or solids?
- What causes gas pressure? How is the pressure of a sample of gas related to its temperature, volume, and number of moles?
- How is gas pressure measured?
- How can we calculate the pressure of a mixture of gases? How molar mass of a gas related to the rms velocity of its particles?
- What is meant by "STP"? Why must calculations involving gases always be done using Kelvin temperatures?

Chapter 14 Liquids and Solids

- What is the relationship between energy and phase changes?
- What forces hold the particles of a substance together in the solid or liquid state?
- How are evaporation, boiling, and vapor pressure related to one another?

Chapter 15 Solutions

- What are solutions? How can we describe their composition qualitatively and quantitatively?
- What are colligative properties? How does the concentration of a solution affect vapor pressure, boiling point, and freezing point?

Chapter 10 Energy & Thermodynamics

- What is a spontaneous reaction? How is reaction spontaneity related to enthalpy, entropy, and Gibbs free energy?
- How can Hess's law be used to calculate the enthalpy change of a chemical reaction?

Chapter 17 Equilibrium

- How do chemical reactions occur? How do temperature, pressure, concentration, and the presence of a catalyst affect reaction rate?
- What is chemical equilibrium? How can it be described using the law of mass action? How is it affected by temperature and pressure?
- How is K_{sp} used to describe solubility?
- How is equilibrium described using Le Châtelier's principle?

Chapter 16 Acids and Bases

- What are acids? What are bases?
- How is pH calculated? How is it related to $[H_3O^+]$ and $[OH^-]$?
- How does K_a describe the strength of an acid?
- What is the role of water in acid-base chemistry? What is K_w?
- What is acid-base titration? How are neutralization reactions described by stoichiometry?

Chapter 18 Oxidation-Reduction Reactions and Electrochemistry

- What are redox reactions?
- How are redox equations balanced?
- How is redox chemistry related to electrochemistry?

Chapter 19 Radioactivity and Nuclear Chemistry

- What are the three main types of radiation?
- How are nuclear equations balanced?
- What are radioactive decay, fission, and fusion? What role do they play in nuclear energy, atomic weapons, the burning of the sun, and medicine?
- What is half-life? How is carbon dating used in the study of archaeology?