

## Chemistry 20: Fundamentals of Chemistry - Fall, 2009

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Chemistry 20 introduces fundamental theories and principles of chemistry applied to inorganic, organic, and biological chemistry. Atomic and molecular structure, chemical and physical changes, gases, solutions and colloids, nomenclature, equations, and calculations will be emphasized.

This course fulfills the chemistry prerequisite for Microbiology 33 and Physiology 31, and for nursing and allied-health programs at some schools (check their specific requirements); it does not fulfill the chemistry requirement for Biology, pre-Medical, pre-Pharmacy, or pre-Dental majors.

**PREREQUISITE:** Mathematics 40 or 41B

### MATERIALS:

1. Timberlake, *Chemistry: An Introduction to General, Organic, and Biochemistry*, 10<sup>th</sup> edition
2. Henrickson, et. al., *A Laboratory Manual for General, Organic, and Biochemistry*, 6<sup>th</sup> edition
3. A scientific calculator (capable of doing exponential notation calculations)
4. Safety goggles (Instructor approved - do not purchase until "fitted" in class)
5. **OPTIONAL:** *Study Guide and Selected Solutions for Timberlake's Chemistry: An Introduction to General, Organic, and Biochemistry*, 10<sup>th</sup> edition

**GRADING:** Course letter grades will be assigned according to the following percentage of total points earned:

Grade	Percent
A	90 - 100%
B	80 - 90%
C	65 - 80%
D	55 - 65%
F	below 55%

**SPECIAL GRADING NOTES:** 1) Because chemistry is a laboratory science, passing work (55% or more of possible points) in the laboratory portion of the course is required in order to earn an overall grade of "D" or higher, regardless of test and quiz scores. 2) A minimum of 65% in the Lecture portion of the course (quizzes, tests, final exam) is required in order to earn an overall grade of "C" or higher, regardless of lab scores. 3) The Final Exam is cumulative/comprehensive for the course, to test what you have learned and retained this semester; when not in conflict with the preceding, your course grade will generally reflect your Final Exam grade, +/- one letter grade.

Approximate distribution of points:

Tests (3 @ 100 points each)	.....	300
Quizzes (8 @ 20 points each)	.....	160
Laboratory (total points)	.....	160
Homework/Assignments/Other	.....	30
Final Exam	.....	<u>200</u>
Course Total	.....	850

## POLICIES, PROCEDURES, AND GUIDELINES FOR SUCCESS

(READ THOROUGHLY - YOU ARE RESPONSIBLE FOR AWARENESS OF ALL THIS INFO!!)

1. Unless you are anticipating a REALLY important call, PLEASE TURN YOUR CELL PHONE OFF!! Points may be deducted for such interruptions - is that incoming call worth it?
2. ATTENDANCE - Be PROMPT and regular in attendance. Quiz and Test questions come from lecture material and WILL include topics covered only in Lecture (i.e. not discussed in the texts)! Excessive absences and/or lateness will likely result in a lower grade - or in being dropped from the class. If you arrive late to LAB you may be excluded from the lab (0 pts) that day .

IMPORTANT NOTE: Any “excusable” absence for a lab, quiz, or test MUST be substantiated by a WRITTEN note; a grade for missed work will be assigned as determined appropriate by the Instructor, on a case by case basis. No written excuse = no points for that assignment!

3. TESTS, QUIZZES, AND THE FINAL EXAM - It is your responsibility to be present and on time for all tests, quizzes, and especially the Final Exam. CHECK THE SCHEDULE! No extra time will be allowed due to late arrival. There will be NO MAKE-UP tests or quizzes. Your best 8 quiz scores will be used in calculating your final point total; ALL 3 test scores will be counted in the final point tally - except that a higher Final Exam score may be substituted for one Test score. Remember, the Final Exam is cumulative and comprehensive!

4. ASSIGNMENTS - Problems from the texts relating to topics covered will be recommended. Working the problems is an essential part of the learning process and gives you practice, drill, and reinforcement of the course material. SOME problem sets may be collected and graded, at the whim of the Instructor. Be prepared to ask questions at appropriate times during class or Office Hours concerning any material or problems you don't understand. Other graded assignments, including in the form of Handouts and/or “pop quizzes”, may be given.

5. LABORATORY - - See the page below relating to Guidelines for Labs and Lab Reports.

6. CHEATING - In a word, DON'T! Penalties range from points off, to zero for the assignment, quiz, or test, to dismissal from the class, to expulsion from the college. More importantly, you are here to get prepared for your next class, or your career. And please don't help someone else to cheat – will you give them part of your paycheck, too, when you work a shift together? Make sure your workmates are as prepared for emergencies as you intend to be!

7. GRADES are EARNED, not appointed. It is up to YOU to learn the material thoroughly enough to do well on Quizzes, Tests, and Labs. PLAN to spend 15-20 HOURS PER WEEK on this course IN ADDITION to time in class! Study effectively: read the texts before lecture; take good lecture notes (taping of lectures is permitted); rewrite your lecture notes to look for holes or areas that are not yet clear; study the texts and your notes; DO ALL THE SUGGESTED PROBLEMS. Use FLASHCARDS to help memorize terms and formulas.

Success is a matter of commitment, preparation, and repetition. IT TAKES TIME TO LEARN NEW MATERIAL AND PRACTICE NEW METHODS. Make use of all possible learning resources - your texts, the Instructor (in class and during Office Hours), tutors, and especially your fellow students. KEEP UP – everything “builds” on earlier material, and the Final is comprehensive - so don't let any gaps develop!!

STUDY PARTNERS OR GROUPS are HIGHLY recommended!

## STUDENTS WITH DISABILITIES, INCLUDING LEARNING DISABILITIES

Students with disabilities, including learning disabilities, who believe they may need accommodations in this class are encouraged to contact the Special Resource Center on campus as soon as possible to better ensure such accommodations are implemented in a timely fashion. If you suspect, or are unsure if, you have a learning disability you are strongly encouraged to contact the Special Resource Center on campus as soon as possible for testing, to better ensure any needed accommodations are implemented in a timely fashion. If you have a documented or suspected disability and wish to discuss academic accommodations, please contact me privately to discuss your specific needs.

## CHEM 20: COURSE OBJECTIVES

### General Skills:

1. use scientific terminology
2. name and write chemical formulas for inorganic compounds: binary nonmetal compounds, salts and acids
3. write and classify chemical equations for elementary chemical reactions
4. perform stoichiometric calculations involving chemical reactions

### Structure:

1. demonstrate a basic understanding of Bohr theory
2. predict and explain periodic trends of elements in terms of electronic configurations
3. describe and illustrate the structure and bonding for molecules by:
4. constructing Lewis structures
5. labeling the molecular geometries of the molecule
6. determining polarity

### States of Matter:

1. use the Kinetic Molecular Theory to explain the behavior of gases
2. perform calculations involving the gas laws
3. relate intermolecular forces to observed properties of solids, liquids and gases

### Aqueous solutions:

1. explain solubility in terms of properties of both solute and solvent.
2. determine concentrations of solutions quantitatively and experimentally
3. give qualitative and quantitative descriptions of solution colligative properties as a function of solute type and solute concentration
4. classify solutes as strong, weak or nonelectrolytes
5. write net ionic equations for chemical reactions

### Acids and Bases:

1. compare and contrast Arrhenius and Bronsted-Lowry acid theories
2. write acid-base reactions
3. determine pH and understand how a buffer works

### Oxidation-Reduction:

1. determine oxidation numbers
2. identify the element oxidized and the element reduced in redox reactions

(Course Objectives, continued – Organic Chemistry and Biochemistry)

Organic Chemistry:

1. use the common and IUPAC systems to name organic compounds of various classes
2. draw structural formulas of simple examples of various classes of organic compounds
3. write equations, using structural formulas, for selected reactions of organic compounds
4. draw structural formulas to illustrate structural isomerism and geometric isomerism

Biochemistry:

1. demonstrate an understanding of chirality by drawing Fischer projections of enantiomers which contain one chiral carbon
2. draw open chain and ring structural formulas for the common monosaccharides
3. describe the linkage between monosaccharide units in terms of the bonding involved
4. state the functions of the common di- and polysaccharides
  
5. draw the general structural formula of a fatty acid and a triglyceride
6. draw the structural formulas of at least three saturated and one unsaturated fatty acid
7. explain the function of a fatty acid in a membrane in terms of the structure of the fatty acid
8. draw a general structure for a phospholipid
9. draw the ring system found in steroids
10. draw the general structural formula for a zwitterion and explain how this structure can function as a buffer
11. draw the structural formulas of at least three amino acids at physiological pH
12. explain the geometry of a peptide bond by using resonance structures
13. state the features which characterize the 1°, 2°, and 3° structure of a protein
14. define denaturation as it applies to a biological system

Laboratory:

1. learn fundamental chemistry techniques such as: titration; use of pH meter
2. become proficient in the use of the following laboratory equipment: electronic balance; common laboratory glassware such as burets, pipets, and volumetric flasks
3. be able to illustrate basic principles of gases, solutions, acids and bases, and oxidizing and reducing agents through experimental set ups

CHEM 20 COURSE LEVEL STUDENT LEARNING OUTCOME:

On a written exercise, given the chemical formulas of reactants, students will be able to write the correct formulas of products, identify the reaction type, and balance the equation.

CHEMISTRY PROGRAM LEVEL STUDENT LEARNING OUTCOME:

Students will practice safe laboratory procedures by putting their goggles on at the beginning of a chemistry lab experiment involving burners or chemicals, and by keeping their goggles in place during the entire course of the experiment. Students will not remove their goggles until the students are leaving or until the instructor has said that it is safe to do so (whichever comes first).

## ECC Resources to Help You Succeed in Chemistry (and Other Courses)

El Camino College provides many resources and programs outside of the this classroom that can help you to succeed in this class, and in other classes. Below are some of the resources that you might find especially helpful.

1. Counseling: Counselors provide students with academic, vocational, career, and personal support counseling. Academic, vocational, and career counseling through Counseling Services will help you identify and focus on goals and objectives - a significant factor in academic success is having a clearly identified goal and knowledge of what it takes to achieve that goal. Personal support counseling is provided on a short-term basis in Counseling Services, but in greater depth at the Health Center.
2. Learning Resources Center: TUTORING, and basic skills and other assistance.
3. Academic Strategies Course: 1abcd, 20ab, 22ab, 23ab, 25ab, 30ab, 31ab, 33ab, 35ab, 36ab, 40ab, 100. These courses focus on specific skills areas, such as test taking, study techniques, math anxiety, listening and note-taking, problem solving, writing, thinking skills, vocabulary, spelling, memory techniques, sentence punctuation, and learning resources skills development. Mid-term classes are available.
4. Special Resources Center: For physically-, visually-, or hearing-impaired, and learning disability students (including dyslexia, ADD and related). Special tutorials, adapted testing assistance, and other services are available to provide academic and related support to students with disabilities. They provide testing to discover possible learning disabilities, and also for determining your study/learning method strengths and weaknesses.
5. EOP&S Supervised Study: Tutoring and other assistance; only for EOP&S students.
6. Career Services and Transfer Services - Counseling Services: The Career and Transfer Center offers a wide array of services which help to motivate students and give them a clear idea of what they need to achieve goals. Services include a number of workshops on career areas and issues, transfer options, and information about specific universities.
7. Student Enhancement Program (SEP) Workshops in Counseling Services: The SEP workshops are actually a three workshop series, two hours each in duration, and are offered throughout the year. Activities in the workshops help students develop a proactive sense of responsibility for their academic performance and generate solutions to problems affecting their academic performance. Students are referred to on- and off-campus services. Workshop participants are encouraged to form “study partnerships” and study groups. Student feedback has been that workshops do make a difference in their classroom attitudes, motivation, personal confidence, and study behavior. Students discuss problems, formulate action plans, engage in exploration of resources, and report back to their group their findings and actions taken.