

Chemistry 20**Fundamentals of Chemistry****Dr. Houben****Fall 2008**

Lecture: 6:00-7:01 pm Mon & 6:00-9:10 pm Wed in Chem 105,

Laboratory: 7:05-10:15 pm Mon in Chem 166

Office hours: 5:30-5:55 Mon & Wed in Chem ???

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*5 units; 4 hours lecture, 3 hours lab**Prerequisite: Mathematics 40 or 41B with a minimum grade of C**or qualification by testing (El Camino College Mathematics Placement Test) and assessment.**Recommended Preparation: eligibility for English 2R**Credit, degree applicable**Transfer CSU, UC**

***Note:** *The maximum UC credit allowed for students completing Chemistry 4 and Chemistry 20 is one course. Students will not receive UC credit for Chemistry 20 if taken after Chemistry 1A.*

This course introduces fundamental theory 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.

Course Materials

1. Timberlake, *Chemistry: An Introduction to General, Organic, and Biochemistry*, 10th Ed.
2. Henrickson, et. al., *A Laboratory Manual for General, Organic, and Biochemistry*, 6th Ed.
3. Calculator with exponential and log capability (note: calculators with significant memory are prohibited during exams, this includes organizer and programmable calculators, check with instructor if you are not sure about your calculator.)
4. Safety goggles (Instructor approved - do not purchase until "fitted" in class)
5. OPTIONAL: *Study Guide and Selected Solutions for: An Introduction to General, Organic, and Biochemistry*, 10th Ed.

Grading		<u>Percentage</u>	<u>Points</u>	<u>Grade</u>
Exams (4 @ 100 points each)	= 400 points	≥ 88 %	≥ 880	A
Quizzes (12 @ 20 points each)	= 240 points	≥ 78 %	780 to 879	B
Labs/Exercises (15 @ 10 points each)	= 150 points	≥ 65 %	650 to 779	C
Participation and Attendance	= 10 points	≥ 54 %	540 to 649	D
<u>Comprehensive Final Exam</u>	= <u>200 points</u>	≥ 0 %	0 to 539	F
Total Points (possible)	= 1000 points			

Quizzes and Tests: It is your responsibility to be present and on time for all exams and quizzes. CHECK THE SCHEDULE! No extra time will be allowed due to you being late. There will be NO MAKE-UP exams or quizzes. Missed quizzes/exams/labs will result in scores of zero unless there are extenuating circumstances. Should such a situation arise, you must contact me or leave a message at least one day before the next class meeting so I can decide the merits of the situation. Generally, doctor appointments, or other appointments are not considered emergencies because they can be rescheduled.

Academic Courtesy: Unless you are expecting a really important call, PLEASE TURN YOUR CELL PHONE OFF!! Points may be deducted for such disruptions - is that incoming call worth it?

Attendance: Students with excessive absences or lateness may receive a lower grade, and/or receive deductions on the Participation and Attendance points. Students who drop the course before the final "W" drop date will receive a "W". It is your responsibility to drop the course to avoid an "F". To drop, you must check out of your lab drawer and have a card signed by the stockroom.

Lab: Bring the lab manual and blank report pages. If you forget pages, you may make copies after the lab lecture. You must attend the entire lab lecture to participate in the lab exercise. Students who arrive late will receive a penalty or be asked to leave depending on what was missed. Writing something on another student's lab paper, bringing in previously graded experiments, or copying a sentence or data is considered cheating. You must do independent work. Keep your lab lecture notes on safety, disposal and important info out during lab. Read the laboratory experiment BEFORE coming to

class, as this will allow you to ask appropriate questions and take full advantage of further instructions provided by the Instructor so that you will be able to complete the laboratory work in the allotted time. Specified “Pre-lab” assignments will be part of the overall lab points total. Lab reports submitted late will earn only partial, or NO credit. Missing a Lab will result in a score of zero for that lab. There is NO time for make-up labs. (See above for what to do if you miss a lab for a legitimate reason.) Although most laboratory exercises will be completed with partners, all reports must be completed independently unless specifically told otherwise! Dress appropriately; wear shoes that cover your feet to labs involving burners or chemicals. Do not touch the chemicals!

Grades: GRADES are EARNED, not appointed. It is up to YOU to learn the material thoroughly enough to do well on quizzes, exams, and labs. PLAN to spend 15-20 HOURS PER WEEK on this course in addition to the time spent in class! Study effectively: read the texts before lecture; take good lecture notes; 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!

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

El Camino College provides many resources and programs outside of 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.

(Note: The information on this syllabus is subject to revision.)

Week	Date	Chemistry 20 (section 1156) Fall 2008 Schedule *this schedule is tentative and subject to change
1	Mon 8/25	Introduction, Chapter 1 Measurements Bring your scientific calculator next class meeting (Wed 8/27). Lab: Chapter 1 Measurements Safety Video: Students must see the safety video to work in lab.
	Wed 8/27	Lecture: Chapter 1 Measurements Chapter 2 Matter
2	Mon 9/01	Labor Day (Holiday) No Lecture or lab
	Wed 9/03	Quiz #1 (chapter 1) Lecture: Chapter 3 Atoms and Elements
3	Mon 9/08	Elements Quiz Lecture: Chapter 3 Atoms and Elements, Chapter 4 Compounds and their Bonds Safety; Check-In; Students must be present at the safety lecture to work in lab. Lab: Experiment 1 Measurement and Density (L2)
	Wed 9/10	Quiz #2 (chapter 2) Lecture: Chapter 4 Compounds and their Bonds
4	Mon 9/15	Lecture: Chapter 4 Compounds and their Bonds Lab: Experiment 2 Graphing (L3)
	Wed 9/17	Exam I (Chapters 1-3) If you miss an exam or quiz, see the syllabus for instructions.
5	Mon 9/22	Chapter 4 Compounds and their Bonds Lab: Handout: Burners (L1). Dress appropriately; remember goggles, closed shoes, and lab experiment. Nomenclature Exercise Handout (open book and open notes, L4)
	Wed 9/24	Quiz #3 (chapter 4) Lecture: Chapter 5 Chemical Quantities and Reactions
6	Mon 9/29	Lecture: Chapter 5 Chemical Quantities and Reactions Experiment 11: Structure of Covalent Molecules and Polyatomic Ions (L5) Lab: Experiment 6 Simple Chemical Reactions (L6) Dress appropriately; remember goggles, closed shoes, and lab manual.
	Wed 10/01	Quiz #4 (chapter 4) Lecture: Chapter 5 Chemical Quantities and Reactions
7	Mon 10/06	Lecture: Chapter 5 Chemical Quantities and Reactions Lab: Experiment 6 Hydrates (L7) Dress appropriately; remember goggles, closed shoes, and lab manual.
	Wed 10/08	Lecture: Chapter 6 Gases
8	Mon 10/13	Quiz #5 (chapter 5) Lecture: Chapter 6 Gases Lab: Experiment 13 Combined Gas Laws (L8) Dress appropriately; remember goggles, closed shoes, and lab manual.
	Wed 10/15	Exam II (covering Chapters 4-6) If you miss an exam or quiz, see the syllabus for instructions.

9	Mon 10/20	Lecture: Chapter 7 Solutions
		Lab: Experiment 17 and Handout: Acid/Base Indicators (L9).
	Wed 10/22	Quiz #6 (chapter 7) Lecture: Chapter 8 Acids and Bases
10	Mon 10/27	Lecture: Chapter 8 Acids and Bases Chapter 10 Introduction to Organic Chemistry: Alkanes
		Lab: Experiment 16 and Handout: Acid-Base Titrations (L10) Dress appropriately; remember goggles, closed shoes, and lab manual.
	10/29	Quiz #7 (chapters 8 and 10) Lecture: Chapter 10 Introduction to Organic Chemistry: Alkanes
11	Mon 11/03	Lecture: Chapter 10 Introduction to Organic Chemistry Chapter 11 Unsaturated Hydrocarbons
		Lab: Experiment 18 Structure of Hydrocarbons (L11)
	Wed 11/05	Quiz #8 (chapters 10 and 11) Lecture: Chapter 11 Unsaturated Hydrocarbons
12	Mon 11/10	Lecture: Chapter 11 Unsaturated Hydrocarbons Chapter 12 Organic Compounds with Oxygen
		Lab: Experiment 19 Properties of Hydrocarbons (L12)
	Wed 11/12	Exam III (covering Chapters 7, 8, 10 & 11) If you miss an exam or quiz, see the syllabus for instructions. [11/14 ≡ last day to drop with a "W"]
13	Mon 11/17	Lecture: Chapter 12 Unsaturated Hydrocarbons
		Lab: Organic Functional Groups Handout (L13) Dress appropriately; remember goggles, closed shoes, and lab manual.
	Wed 11/19	Lecture: Chapter 13 Carboxylic Acids, Esters, Amines and Amides
14	Mon 11/24	Quiz #9 (chapter 12) Lecture: Chapter 13 Carboxylic Acids, Esters, Amines and Amides
		Lab: TBA
	Wed 11/26	Quiz #10 (chapter 13) Lecture: Chapter 14 Carbohydrates
15	Mon 12/01	Lecture: Chapter 14 Carbohydrates Chapter 15 Lipids
		Lab: Organic Functional Groups Handout (L14) Dress appropriately, goggles, closed shoes, and lab manual.
	Wed 12/03	Exam IV (Chapters 12-14) Lecture: Chapter 16 Amino Acids, Proteins and Enzymes
16	Mon 12/08	Quiz #11 (chapters 15 & 16) Lecture: Chapter 16 Amino Acids, Proteins and Enzymes
		Lab: Experiment 25 Detection of Fats, Proteins, and Carbohydrates in Food (L15)
	Wed 12/10	Final Exam (comprehensive)

COURSE OBJECTIVES

General Skills - The student will become proficient in the ability to:

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 - The student will:

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: constructing Lewis structures, labeling molecular geometries, determining polarity

States of Matter - The student will:

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 - The student will:

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

Acids and Bases - The student will:

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 - The student will:

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

Organic Chemistry - The student will:

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

Biochemistry - The student will:

1. demonstrate an understanding of chirality by drawing Fischer projections of enantiomers containing one chiral C
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 primary, secondary, and tertiary structure of a protein
14. define denaturation as it applies to a biological system

Laboratory - The student will:

1. learn fundamental chemistry techniques such as titration, use of pH meter
2. become proficient in the use of: balance, common laboratory glassware such as burets, pipets, and volumetric flasks
3. illustrate basic principles of gases, solutions, acids and bases, and ox and red agents through experimental set ups.

