Chemistry 21B: Survey of Organic and Biochemistry - Spring, 2008

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Chemistry 21B is the second semester of a two-semester sequence designed to provide students with the skills and knowledge needed to satisfy the requirements for several allied health related majors. This course continues the study of Organic Chemistry begun in Chemistry 21A and presents an overview of biologically important classes of compounds and their metabolic pathways.

PREREQUISITE: Completion of Chemistry 21A or equivalent, with a minimum grade of C.

MATERIALS:
1. Seager & Slabaugh, *Chemistry for Today: General, Organic, and Biochemistry*, 5th or 6th edition
2. Peller, *Exploring Chemistry: Laboratory Experiments in General, Organic, and Biological Chemistry*, 2nd edition
3. Recommended: Campbell and Wolf, *Chemistry 21B Supplement, Part 1 (Organic Chemistry and Biochemistry)* and *Part 2 (Biochemistry and Metabolism)*; Campbell, *Chemistry 21A Packet*
4. Safety goggles (Instructor approved - do not purchase until "fitted" in class)
5. OPTIONAL: *Study Guide and Solutions Manual for Seager and Slabaugh's Chemistry for Today: General, Organic, and Biochemistry*, 5th or 6th edition

GRADING: Final 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 "C" 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 Exam grade, +/- one letter grade.

Approximate distribution of points:

Tests (3 @ 100 points each)	300
Quizzes (4 @ 25 points each)	100
Laboratory (total points)	180
Homework/Assignments/Other	20
Final Exam	200
Course Total	800

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 4 quiz scores will be used in calculating your final point total; ALL 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 - Read laboratory experiments 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. 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!

6. 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 and REACTIONS

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Success is a matter of preparation and repetition. You've passed Chem 21A, so you already know you have the ability to pass this course. But, the material presented IS more complex – IT TAKES TIME TO LEARN IT. Make use of all possible learning resources - your texts, the Instructor (in class and during Office Hours), tutors if necessary, 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!

HINTS ON HOW TO STUDY ORGANIC CHEMISTRY AND BIOCHEMISTRY

For the study of ORGANIC CHEMISTRY we are taking a "functional group" approach. The key to this is to recognize specific bonding arrangements or groups of atoms (the functional groups) in a compound - from either its name or structure - and then to KNOW specific PHYSICAL properties and CHEMICAL properties (REACTIONS) typical of compounds containing the functional group(s).

Typically, for each "FUNCTIONAL CLASS" of compounds studied we will focus on:

A. STRUCTURE - the atoms and bondings involved; polarity of bonds and molecules; shape

B. NOMENCLATURE - common names, and IUPAC naming rules – LEARN THEM!

C. PHYSICAL PROPERTIES - especially density, solubilities, mp & bp (POLARITY is key!)

D. REACTIONS -

1. WHAT can happen AT the functional group – the products possible from its interactions with other substances (or functional groups) : LEARN these as a LIST for each functional group! including any special conditions or catalysts required;

   A LOT of organic chemistry (and BIOCHEMISTRY/PHYSIOLOGY) involves transformation of one functional group into another! What you learn in Organic you will see and use again in Biochemistry!

2. HOW a specific reaction occurs - the MECHANISM of the reaction; we will be learning several reaction mechanisms this semester; you'll need to get comfortable with writing these to excel in the course!

"A" and "B" above are interrelated - from a name you should be able to draw a structure; for a structure you should be able to provide a name. The Rules MUST be learned and followed - for both common and IUPAC names; we will review and build on what you learned in Chem 21A.

"C" above requires recollection of bonding and molecular geometry from Chem 21A - now applied to interactions between molecules, and sometimes within molecules.

"D" is best learned by making a LIST for each functional group of the reactions that it can do, especially transformations into other functional groups. Remember, most reaction systems exist as equilibria of reversible reactions - so we should recognize both what a functional group "does", and also how it can form! We will not learn mechanisms for all reactions - just some selected few. These will allow us to better understand HOW a functional transformation can occur - and often show why the same functional group can react in several different ways as conditions change.

BIOLOGICAL COMPOUNDS typically contain more than one functional group - and can get quite complex. Common names are most frequently used and must be learned. And there is more detail to learn about structure/geometry and its effects on properties. BUT, what you learn about each INDIVIDUAL functional group still applies! We'll especially watch for how the presence of one group can influence the behavior of another.

In the study of METABOLISM we will learn PATHWAYS of SEQUENTIAL reactions - but the reactions are (mostly) the same as learned previously. Only the structures get more complex! Look for underlying commonality of structures, and behaviors - but expect some surprises!

Chemistry 21B - Course Objectives

By the end of the course you should be able to:

1. Do each of the following for the functional classes alkanes, alkenes, alcohols, phenols, ethers, aldehydes, ketones, amines, carboxylic acids, and carboxylic acid derivatives:
   a. write a name given a structure and vice-versa.
   b. state common sources.
   c. write equations for common reactions and methods of preparation.

2. Identify the type of mechanism used in common organic chemistry reactions as either concerted, or involving a carbocation or a carbanion intermediate, and illustrate the mechanism for representative reactions studied.

3. Do each of the following for carbohydrates, lipids, and amino acids:
   a. draw chemical structures for important members of each of the classes.
   b. write equations for common reactions of each class.

4. Explain in writing the Krebs cycle in terms of the structural changes involved in each step of the cycle, the energy produced by the cycle, and the places in the Krebs cycle where other cycles enter or leave the Krebs cycle.

5. Discuss the structures of proteins and nucleic acids, and the genetic processes of replication, transcription and translation in terms of the structural changes and chemical reactions which are involved.

6. Analyze the effect of pH, temperature, concentration of substrate and concentration of enzyme on the ability of any enzyme to function normally.

7. Name an enzyme on the basis of its function.

8. Discuss how ATP is made in the mitochondrion, the function of **$NADH/H^+$ and $FADH_2$** in this process, and where the energy is stored in ATP.

9. Analyze carbohydrate, lipid, and protein catabolism and anabolism in terms of the structural changes involved in each step of these processes, ATP input and production, and function of each process.

10. Use common organic laboratory techniques for the synthesis, characterization, and identification of several classes of organic and biochemical substances.

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 disablity 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.