

Syllabus Chem 28A Organic Chemistry.

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Reedley College, Fall 2013

Lecture: TTh 12:00pm-1:15 in Room LFS B

Section: 50182

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Lecture

In general, read each chapter ahead of the discussion and explanation in lecture. We will use some computer programs, an ochem app, and worksheets to practice the material. Each lecture ends with a homework assignment for the next class meeting so that you can keep up with the material. Blackboard will provide you with handouts and homework. Be sure to check in frequently.

Textbooks

1. McMurry, Organic Chemistry with Biological Applications, 2nd edition
2. Traynham, Organic Nomenclature, 6th edition

Course objectives: Chem 28A is an organic chemistry course designed for biology and biological science majors. Chemical engineering, pre-med, pre-dental, pre-vet and pre-pharmacy professional majors will also need (and enjoy) this course. Students will acquire a solid base to study biochemistry, pharmacology and other biology and chemistry related fields in medical school, pharmacy school, chiropractic college, vet school etc. In this class we learn how to recognize and name the principal functional groups in organic compounds, and we make a thorough study of the reactions of these functional groups with emphasis on theory and mechanism. You will gain an understanding of chirality and its influence on the reactivity of organic compounds in biological systems. In addition, analysis of MS, IR and NMR spectra will be part of this course.

Everything we do in this class is geared to a successful transfer for you to reputed four year institutions such as Cal Poly, UOP, USC and all schools in the CSU and UC systems. This course is also helpful towards your preparation for the MCAT and PCAT.

Student Learning Outcomes:

- A. Analyze the structural formula of an organic compound, recognize its functional groups and name it properly.
- B. Draw a structural formula given the systematic name of an organic compound.
- C. Recognize chiral compounds and understand their physical properties.
- D. Complete the reactions of many aliphatic molecules and write the correct reaction mechanism.
- E. Analyze MS, IR and NMR spectra and determine the structure of an unknown compound.

Quizzes and exams: There will be three quizzes and the average score of these quizzes is worth two exam scores. Including the final there will be a total of three exams, typically covering more material than the quizzes. Each exam including the final will be equally weighted. When a student does not show up for a quiz or exam without prior notice, it is graded with a zero (0) and loss of the incentive described under Grading. This grade (a zero) is also used for fraudulent behavior.

To summarize, the percentage that each type of test counts towards your final grade is as follows:

Average of the exams 50.00%

Average of the quizzes 33.33%

Average of the homework, work sheets and pop quizzes 16.67%

Grading: The average of graded homework, worksheets and pop quizzes is worth the weight of one exam score. If the student's attendance is 95% and he/she has fulfilled all the assignments properly and submitted **on time**, the lowest grade of the quizzes will be dropped. Realize: Making due dates and times is essential.

Typical break-off for grading: A_≥ 90%; B 80-89%; C 70-79%; D 60-69%; F_≤ 59%.

Homework and Worksheets: Homework will be assigned often. It is crucial to your success that you complete your worksheets and do your homework, with the emphasis on problems and readings in McMurry's text. Occasionally homework and worksheets will be collected and selected problems graded.

Drop date: The final date to drop this class is Friday October 11, 2013. After that day a letter grade needs to be assigned and it will appear on your transcripts. You will avoid a "W" when you drop the class before or on Friday August 30, 2013. You are responsible to take care of a timely drop.

Attendance and class rules: In accordance with Community College policy attendance is mandatory. If you miss two weeks or four consecutive lectures *without prior notice* you will be dropped automatically.

Use of cell or smart phones, tardiness, leaving early, stepping out of class, sleeping during class, text messaging etc., in general, doing other work than directly pertaining to the organic chemistry Chem 28A course is all considered disruptive behavior. This might cause you to be expelled, but it will always be "punished" with an absence.

In this class you are not allowed to miss any assignment. In case of serious emergency, always let me know *in advance* if you need to miss a homework, worksheet, quiz or exam. Also, you will be required to show evidence for your absence, e.g. a note from the doctor. If you omit this, it will cost you the incentive described above, and you will get the lethal zero grade.

Lecture topics.

Each topic will require about two weeks. The topics studied represent the chapters in McMurry's text book. You are supposed to read the chapters ahead of time. Also, watching Khan Academy video's, and using the free ochem app on your phone (look for OCE), can be very helpful to fully understand the material.

1. Structure and Bonding. Hybridizations. The Nature of Chemical Bonds
2. Polar Covalent Bonds. Acids and Bases
3. Organic Compounds. Alkanes: Naming and Stereochemistry. Introduction to Functional Groups
4. Cycloalkanes and Their Stereochemistry. Stability, Ring Strain, Conformations
5. An Overview of Organic Reactions. Introduction to Reaction Mechanisms
6. Alkenes and Alkynes: Naming alkenes using E-Z nomenclature. Stability of Alkenes. Carbo-cation Structure, Stability and Rearrangements. Markovnikov's Rule Regarding Addition Reactions to Alkenes and Alkynes
7. Reactions of Alkenes and Alkynes. Preparations, Halogenation, Halohydrins, Hydration, Reduction, Oxidation, Radical reactions, Conjugated Dienes and Their Reactions
8. Aromatic Compounds
9. Stereochemistry. Enantiomers and the Tetrahedral Carbon. Chirality, Optical Activity. Meso Compounds. Stereochemistry of Reactions. Chirality in Nature

10. Alkyl Halides. Nucleophilic Substitutions and Eliminations. S_N1 , S_N2 and E1, E1cb and E2 Mechanisms. Biological Elimination Reactions

11. Structure Determination. Mass Spectrometry (MS), Infrared Spectroscopy (IR), and Ultraviolet Spectroscopy (UV). Interpreting Spectra. In the organic lab, Chem 29A you will get a chance to work hands-on with an FTIR, NMR and GC-MS. [GC= Gas- Chromatography, MS= Mass Spectrometry]

12. Structure Determination. Nuclear Magnetic Resonance Spectroscopy (NMR). Chemical shifts, ^{13}C NMR, 1H NMR and Proton Equivalency, Spin-Spin Coupling

13. Alcohols, Phenols, and Thiols. Ethers and Sulfides. Naming, Properties, Preparations and Reactions. Spectroscopy of Alcohols, Phenols, and Ethers

14. Aldehydes and Ketones. Nucleophilic Addition Reactions

There will be no class on Thursday November 28, the first Thanksgiving Holiday.

Important: *If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.*

Lecture Quizzes and Exams

Suggestion: write these dates down in a separate calendar, your phone or your agenda. This semester's class is large; we might schedule our quizzes and exams in a different room. Exams and quizzes will have a mix of multiple choice and essay questions.

Thursday 8/29	Quiz 1
Thursday 9/19	Exam 1
Thursday 10/10	Quiz 2
Thursday 10/31	Exam 2
Tuesday 11/21	Quiz 3
Thursday 12/12	Final Exam @12:00pm-1:50 in LFS B

Recommended readings and useful computer programs.

1. Brown and Foote, Organic Chemistry
2. Luceigh, Chem TV Organic Chemistry I and II
3. Timberlake, Biological and Organic Chemistry
4. Zubay, Biochemistry