

MWF 11:45-12:45 PM 202 Reichardt Bldg
Instructor: John Keller
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(Mist D'June-Gussak, Administrative Assistant)

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- Required Materials:** (1) *Organic Chemistry 7th Ed.*, McMurry, Cengage
(2) Non-programmable scientific calculator
(3) Turning Point systems RF clicker
(4) OWL card
- Recommended:** (1) *Study Guide & Solutions Manual*, McMurry, 7th^d Ed
(2) HGS Molecular Model set
(3) Preparing for the ACS Organic Chemistry Exam
- Optional:** *2nd Semester Organic Chemistry. Practice Exams: Blanks*
2nd Semester Organic Chemistry. Practice Exams: Keys
J. W. Keller. from Dateline Copies in Campus Corner Mall; about \$10 ea.
- Prerequisite:** Chem 321 (or equivalent course) with C or better, or permission of instructor.

Objectives. This is the second semester of a two-semester series designed to introduce, chemistry, biochemistry, pre-meds, engineers, and others, to organic chemistry. Chapters 17-26 of *Organic Chemistry 7th Ed.* will be covered, either by lecture or reading or both. These chapters emphasize the chemistry of O and N-containing functional groups that are common in biological molecules. Many of the concepts introduced earlier will be seen in this new context, including Brønsted acids/bases, nucleophilicity, electrophilicity, bonding in organic molecules, resonance, and descriptions of reactivity in organic and biological systems.

1. The most important goal of this course is for students to learn to use the **principles, thinking procedures, and logic of chemistry**. This allows one to apply chemistry concepts to new situations and to many different molecules. *Some* memorization is required, but *memorization alone does not suffice*.
2. Some hoped-for **Learning Outcomes**: (1) students should use the reactions studied (cumulatively, including Chem 321) to **design synthesis sequences up to ten steps**; (2) write out reasonable **post hoc mechanisms** using curved arrow notation (“electron pushing”) for acid catalyzed-, base-catalyzed, nucleophilic, and electrophilic reactions; (3) interpret first-order **¹H- and ¹³C NMR spectra** of known compounds, and use such spectra to help solve unknown structures; (4) use **HyperChem** to build and optimize small molecules and ions, including analysis of different possible conformations, molecular orbitals, and electron density surfaces; (5) develop and use a **chemistry vocabulary**.
3. It will be important to understand and **solve problems** relating to stoichiometry, stereochemistry, nuclear magnetic resonance spectroscopy, organic synthesis, acid-base theory, and organic mechanisms.
4. Students will be expected to remember some facts that serve as **the vocabulary of chemistry**, including the names and structures of several common compounds and 65 new organic reactions out of the total of about 90 reactions discussed in these chapters (see 322 Reactions List).
5. It is important that students use *HyperChem*, or other **molecular modeling** software, on a regular, i.e. **daily or weekly**, basis to answer questions about molecular structure and reactivity. This tool is now widely used in many areas of chemistry and biology and gaining facility with it is vitally important.
6. **Biological chemistry** examples are presented in the text and lecture. This info may appear on exams.
7. **Quantitative aspects of chemistry**, including stoichiometry calculations, 2nd Law of Thermodynamics,

the Henderson-Hasselbach equation, and chemical kinetics will be discussed and may appear on exams.

American Chemical Society approval. The chemistry curriculum at UAF is the only one in Alaska approved by the Committee on Professional Training of the American Chemical Society. This course and Chem 321 are reviewed in detail for depth and breadth of coverage with the view toward providing optimal training in organic chemistry for chemistry, biochemistry, and environmental chemistry majors. Therefore the nearly complete coverage of 26 chapters of the McMurry textbook over two semesters is mandated not by the personal preferences of your professor, but by the need for us to meet the requirements of national approval for chemistry education.

Resources

Course web site: Please regularly visit <http://ww.uaf.edu/chem/322Sp09/> for announcements, handouts, exam keys, links to class notes, etc.

2nd Semester organic is a tough course. Plan to study organic at least 90 minutes per day. See the following website for more detailed advice (this is one of many that repeat the same themes): <http://chemistry.umeche.maine.edu/CHY251/howto.html>. If you're jumping into Chem 322 after a hiatus, check the following: <http://chemistry.umeche.maine.edu/CHY252/LastSemester.html>

Homework. A very important study habit developed by successful organic students is **writing out** answers to as many exercises and additional problems as possible. Passively reading and thinking about the answers is not adequate: you should *struggle* to write down the correct answer. Keep your homework organized in a separate notebook. Access to a *Study Guide* is indispensable! However, consult the study guide only after having written out several answers, and don't peek at other answers. Homework will not be collected or graded, except for OWL. The OWL homework is nice, but you also need to bring out the pencil and paper and do some/most/all of the recommended problems from back of each chapter. See the handouts with recommended problems.

Online Web Learning (OWL). There are assignments in most chapters in OWL, with the assignments due during the week the material is covered in class. See handout for due dates. Students continuing from Chem 321 Fall 2008 may not have to purchase another OWL access card – check the dates. These problems give a decent coverage, but some important subjects are not covered in OWL.

HyperChem. Regular use of molecular modeling to understand organic chemical structure and reactivity is expected. *HyperChem* is running on computers in the Chemistry Computer Lab, or you may download a free 20-day copy of the program, or you may purchase a nearly-complete student version for \$90 from www.hypercube.com.

Chemistry computer lab. The Chemistry Department computer labs (Rooms 163 and 172 in NSF) are open 24x7 for all Chem 322 students. Obtain a userID, password, and the room combination from JK or Mist D'June-Gussak in room 194 NSF. Use the userID and password to log on to a workstation in the lab. (Your fsxyz will NOT work on these computers.) Visit the Chem Dept web site and follow the link to [Computer Lab Information](#).

Copies of old exams. Copies of quizzes and exams from previous years including blank exams are available in the books *Second Semester Organic Chemistry. Blank Exams* and *...Exam Keys* at Dateline Copies in the Campus Corner Mall (479-3831); cost about \$10 ea. Call ahead and order one before you go down there.

Library reserve materials. Several kinds of information are on reserve at the Rasmuson Library Reserve Desk for this course (actually use Goldmine to search “keller”, then check both 321 and 322.):

1. Seven additional texts that provide alternative explanations and additional problems.
2. HGS Molecular model set. Use this if you left yours at home. *Always study organic with a model in your hand! Also pencil and paper!*
3. *Electron Movement a Student's Guide*. Weeks. Further explains curved-arrow notation
4. *The Organic Chemistry Exam file*. Extra solved problems.

Support Services. Some semesters the American Chemical Society Student Affiliates club provides free tutoring in various chemistry disciplines. Usually a tutoring schedule is posted near the beginning of the semester outside the student room, 170 NSF. Also, the other organic chemistry profs Tom Clausen and Tom Green have invited Chem 322 students to ask chemistry questions if JK is not in his office.

Students with documented disabilities who may need reasonable academic accommodations should discuss these with the professor during the first two weeks of class. You will first need to provide documentation of your disability to Disability Services in the Center for Health and Counseling, 474-7043, TTY 474-7045.

Policies

Grading Policy. The final letter grade will be based on the sum **S** (max 750 points), where $S = H + Q + C + F$, where

H = 130% best + 110% 2 nd best + 90% 3 rd best + 70% 4 th best hour exam (100 pts each) ...	400
Q = % of OWL scores * 120	120
C = % clicker score for the semester * 80	80
F = final exam (two-hour, 150 points).	<u>150</u>
Total.....	750

Typical cut-offs used in past years for each letter will be (**approximately**) 85/72/60/50% of the maximum number of points for A/B/C/D respectively; these may differ from the stated values by several percentage points. No +/- grades are given.

Audit grade. To receive the “AU”, students must complete 50% of the assigned OWL problems, 50% of in-class clicker questions, and seriously attempt three out of four hour exams and the final exam. Simply attending lecture and listening *in no way* leads to learning of chemistry and is a *waste of time*: this science requires *active learning*. (This advice applies to all students in the class whether you are enrolled for credit or not.)

Attendance. Students are expected to attend class; attendance will be taken indirectly with TurningPoint clicker questions.

“Clickers” Each student must purchase and register a clicker, which is used in lecture to answer questions projected on-screen. Most students will have a working clicker from taking other UAF classes. In this case there is no need to purchase a new clicker. The correct clicker is available at the UAF Bookstore or via the web. Register the clicker in class. Most question answers will be recorded electronically. A correct answer is weighted 2, incorrect 1, and no answer 0. The percent maximum score at the end of the semester will be multiplied by 80 pts and included in the semester total. **Please note: bringing the clicker to each class, taking care of it, replacing it if lost, and keeping it supplied with fresh batteries is the student’s responsibility.** If you forget it once or twice, be philosophical: the half-point involved will not affect your overall grade. The professor will not be making individual corrections on clicker scores, unless a serious error is propagated through the whole class. About 5-10 zeros will be forgiven to account for *any kind of absence* due to sickness, travel, family emergency, etc. Think about it: it is not possible to “make up” an in-class clicker question.

Hour exams. Four 60-minute 100-point exams each covering the material in two chapters will be given in class on the following dates.

Exam I..... Wednesday, Feb. 11..... Chapters 17-18
Exam II Monday, Mar. 2 Chapters 19-20
Exam III..... Friday, Mar. 27 Chapters 21-22
Exam IV Wednesday, April 15 Chapters 23-24

All exams are required. If you have to miss a scheduled hour exam due to sickness, travel, or personal emergency, please try to let JK know ahead of time. A (different) make-up exam will be scheduled soon after your return.

Understanding organic chemistry depends on learning previous material, therefore the concepts, reactions, and structures discussed earlier in the textbook *may appear on any exam*.

Final exam. A 120-minute final exam published by the American Chemical Society covering Chapters 1-26, will be given in the lecture room on **Friday, May 8, 10:15AM-12:15 PM**. This style of exam is made necessary by UAF's requirement for nationally-normed assessment of the Chemistry 321-322 series. Preparation and review for the final exam will occur at different times throughout the semester. The recommended text from ACS contains many useful practice exam questions and review topics.

No early or late final exams will be given. The time of the final exam is determined by the UAF Faculty Senate, not your teacher. If you don't like this time, or it does not fit your schedule, please consider taking this course at another time. If you cannot take the course at another time, then adjust your travel and study plans accordingly. If you miss the final exam due an emergency, the usual policy is to assign an Incomplete (I) grade, then take a final exam at some later date.

Department of Chemistry policy on cheating. "Any student caught cheating on graded work will be assigned a course grade of F. The student's advisor will be notified of this grade assignment and the student will not be allowed to drop the course."