## Course: CHEMISTRY 3514: Organic Chemistry I Fall 2016

**Professor:** Dr Jerry Fong (587-3692, Physical & Health Science Bldg 305)

 E-mail addresses: campus: FONGJD;

**Required Texts:**  **“Organic Chemistry,”** John McMurry 8th edition `hybrid’ paperback (**w/o OWL v2**) 2012

**Course Website:** [**http://web.alfredstate.edu/fongjd/OrgChem1.htm**](http://web.alfredstate.edu/fongjd/OrgChem1.htm)

**Suggested Model Kit:** “**Darling Molecular Model Kit”** (will be required in Organic II)

**Suggested Software:** [**http://www.acdlabs.com/downloads**](http://www.acdlabs.com/downloads)*download Chemsketch 11.0 freeware*

Very useful for creating organic molecular structures in synthesis lab reports

**Syllabus:** Chapters 1-3,5-7, 10,11 (for relevant pages see Course Syllabus, reverse page)

**Grading:**  **Item pts each total pts % of total**

 Homework (10) 30 300 30

 3 Exams 100 300 30

 Lab\* 300 30

 Take-home Final 100 100 10

  **1000 100**

 *\*If you miss two labs or flunk the laboratory portion of the course, you flunk the entire course !!*

 *A: 90=100% B: 80-89% C: 70-79% D:60-69% F: <60%*

**Course Mechanics:**

Homework will be assigned and available each Monday and due the following Wednesday. I will not accept late homework. **If** sufficient student interest arises I will try to hold a regular (once-weekly) recitation but it must be student-generated interest that triggers the recitation. Many in-class `drill & practice’ Powerpoint exercises as well as in-class paper exercises form the backbone of the course. I am not big on just lecturing. You guys have to get involved and practice the craft of Organic Chemistry, which means lots of active classroom gymnastics. There will also be numerous handouts summarizing and capturing key pieces of the lecture. These will complement the text and provide the instructor’s own `spin’ to the material. You are advised to keep a binder of these and to date each item. You are **utterly responsible** for reading the text sections listed in the course syllabus on the reverse. **Do not rely just on the lecture**. Note too, that just about everything I present during the semester is made available at my homemade course website (see URL above.)

**Course Goals:**

Current Evolutionary Theory says-and I am not making this up- that Life arose from a chain of chemical transformations starting from foolishly simple compounds like ammonia and methane to astoundingly complex organic critters like proteins and DNA, and, thence {upon aggregation, coalescence and just plain shucking and jiving), to entities as different as fleas and redwoods. This is like saying that glass marbles, if banged, rattled and rolled hard enough and long enough, can become a coffee cup or the Statue of Liberty.

To begin to apprehend this fantastic, improbable story, it is helpful to view organic compounds like they’re little animals. It then becomes natural to ask (at least) the following four questions:

1) what do these organic animals `look like’ and how do they act by themselves? (structure & properties)

2) how do they react to the presence of other, different organic critters? (reaction class)

3) What can we easily cross breed them into? (synthesis)

4) what controls the rate and outcome of breeding? (mechanism)

Answering these four questions are the goals of Organic Chemistry at Alfred State. A more technically rendered version of these goals, the student learning outcomes (SLOs) are below: **At the end of the Fall semester, students should be able to:**

1) properly identify, name and draw the geometric and electronic structure of most simple aliphatic compounds and

 relate how these structural features govern boiling point, melting point and thermodynamic stability

2) recall the major reactions typical of the several classes of elementary functional groups covered, e.g. alkanes,

 alkenes, alkynes , alcohols, ethers and alkyl halides

3) use their knowledge of reaction directions, mechanism and molecular structure to create rational and reasonable

synthetic pathways to moderately complex compounds starting from a simple starting compound or two.

4) rationalize both the direction and mechanism of these reactions in terms of geometric and electronic structure.

**Course Ethics :**

You can expect good manners, honesty, tolerance, humor and fairness from me. I expect the same from you. You will be ejected from class permanently with an Instructor Initiated Drop and an F if you act with chronic disregard with the Alfred State code of behavior. This policy will be in particular force if you are caught cheating. I utterly detest cheaters.

**Course Philosophy**:

Organic Chemistry is universally viewed as hard and (in)famously unreasonable in its demands on students. At big, premiere schools like Cornell, Harvard and Berkeley, organic chemistry is taught at machine gun rates (sometimes a chapter or two/50 minute lecture). This is done, frankly, -not in the name of learning- but because first year organic chemistry is the pre-med ‘weed-out’ course. The rationale seems to be that if you can cram it all in your head long enough to pass the exams, you must be smart enough to be an MD. I completely reject this asinine approach. It sucks the life right out of the classroom and (fyi) it nearly made me quit chemistry altogether- illustrating the distressing fact that even the most committed and dedicated students can be derailed by indifferent teachers.

*Organic Chem 3514 Fall 2016 syllabus (continued)*

This is why I teach Organic Chemistry way, way, way differently than they do at those other places. For my money, what Organic Chemistry ultimately teaches you is a unique ***thinking style.*** Organic chemists apply this style as they seek underlying pattern and sense from often disjointed and conflicting piles of information. Part of this admittedly involves remembering things, but the process and approach you take to permanently organizing, imagining and fixing information into your cranium constitutes the real lesson. If you master the organic chemist’s ***approach*** to dealing with puzzles and problems you’ll have permanently gained a foundation skill critical to science, medicine and to living in general.

Getting you to actively practice and permanently take this skill in your bones is the course’s real focus.

This is not to say that you won’t be responsible for a ton of chemistry. You’ll span ~ the same amount of material as the folks at all the big schools. However, the instructor’s lectures will focus on active, in-class practice with thinking like an Organic Chemist. Just like symbols and numbers in math, the details of organic chemistry (reaction and mechanism) are not the end in themselves, but the fodder for practicing a particular style of reasoning. It may not be Berkeley, but then, Berkeley ain’t Alfred State. I vowed 15 years ago when, I first taught this course. to never to make students feel as discouraged and demoralized as I was when I took Organic Chemistry the first time. We’re going to hang loose, work together and have some fun. So, buckle up and let’s go for the ride through Organic Land.

**SYLLABUS**

**CHEMISTRY 3514 FALL 2016 (FONG)**

# Weeks Dates General Topic Specific Topics Text pages to read

**1-2** 8/29-9/9 Bonding Models *Lewis, Valence bond, MO, drawing compounds*  **3-26;**

**3** 9/14-9/16 Intro to Alkanes *Naming, drawing, isomers and stereochemistry of R-H* **60-87**

**4** 9/19-9/23 Chemistry of Alkanes  *The Free Radical Substitution: RH 🡪 RX;*  **148-153; 278-283**

*Energy Diagrams and Hammond Postulate* **169-174***;***204-206**

## 5 9/26-9/30 Freons *Ozone Layer and Free Radical Chemistry of the Upper Stratosphere* handout

 Alkyl Halides I  *Properties and Naming of RX ;*   **278-299**

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**6 10/1-10/4 3 October- 6 October Fall Mini break**

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**6** 10/5 Alkyl Halides I (cont.)  *Preparations of RX;*   **278-299**

## 6 10/7 EXAM I Friday 7 October *through Freons & Naming Alkyl Halides*

**7-8** 10/10-10/21Alkyl Halides II  *Reactions of RX: SN1, SN2 and E2* **300-340;513-514**

**9** 10/24-10/28 Alkenes I *Naming, reactivity of π bonds,* **180-194;**

*Preparation via E1 alcohol dehydration* **213-214; 515-518**

**10** 10/31-11/4 Alkenes II *Reactions of >C=C< : additions* **214-234; 237-249**

**11** 11/7 -11/9 Alkenes II (continued)*Reactions of >C=C< (cont.): oxidation, substitutions, polymers* **234-6; 239-244;283-5**

## 11 11/11 EXAM II Friday 11 November *Alkyl Halides and Alkenes I,II*

12 11/14-11/18 Road map problems *Alkenes in review*; *Introduction to synthesis* **251-252; 269-274**

**13 11/21** Recitation *Bring in problems from course that hang you up still*

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## 13 11/23-11/27 Thanksgiving Break *Wednesday 23 November- Sunday 27 November*

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**14 11/28-12/2** Road mapping (cont.) *Extended class exercises in devising syntheses* ***`* 251-252; 269-274**

15 12/5 Roadmaps (continued) *Synthesis practice/Review*

 Kitchen Sink Powerpoint Drill/Practice all reactions to date

**15 12/7 IN-CLASS EXAM III Wednesday 7 December *Alkenes II (no syntheses) 100 pts***

 **TAKE-HOME EXAM III (“FINAL”) DUE by Wednesday 12/14 *(syntheses) 100 pts***

15 12/9 Parting Shots

**16** 12/12-12/16 **FINALS WEEK**