Bio-organic Chemistry, CHEM 300
Spring 2008

Lecture: 1:00 p.m., MWF, MAC 105 (class #3427)
Prerequisite: C or better in CHEM 212 or CHEM 108

Instructor: Dr. W. Johnson
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office hours: 11:00-11:50 a.m., MWF
or by appointment

Web site: http://www.uwgb.edu/johnsonw/

Course materials:

Fundamentals of Organic Chemistry, 6th ed., McMurry and Simanek, Thomson, Brooks/Cole, 2007.

Study Guide and Solutions Manual for McMurry and Simanek's Fundamentals of Organic Chemistry, 6th ed., McMurry, Thomson, Brooks/Cole, 2007.

The Molymod™ Molecular Model Set for Organic Stereochemistry, Indigo® Instruments.

Online Web-based Learning (OWL), purchase with new book or separately.

To purchase OWL separately ($28.49) go to the Phoenix Bookstore web page: http://www.thephoenixbookstore.com and click on **ichapters.com** (found in right column, near bottom of page). In the **Basic Search** box enter this ISBN: **0495051012**. Click on **My Cart** in upper right corner and then checkout.

To register OWL after you have purchased an access code go to: http://owl.thomsonlearning.com/ At the "Login or Register" choose **Organic** and then select our textbook (see above title). Choose **University of Wisconsin – Green Bay** and then choose the **Student Registration** link. After registering you are ready to use OWL.

To use OWL after you have registered go to: http://owl.cengage.com/owl-c/user/loginpage.cgi?Server=owl-univwisconsingreenbayfundo&UserType=Student and enter your login and password.

The purpose of this course is for you to learn the fundamental chemistry of the molecules of life in one semester. These organic molecules contain a variety of different functional groups. After completion of this course you ought to understand the molecular structure and the reactivity of organic molecules with precision and biology ought to become more understandable at the molecular level.

Working out the problems in the text is highly recommended! In addition to problems in the text, problems at OWL are assigned for each chapter. There are 150 points for problems assigned in OWL (10 points for each chapter). There will be 4 one-hour exams (400 points), a two page article on the organic chemistry of a topic of interest (100 points), and a final exam (200 points), which will contribute to your grade for the course (850 points total). Make-up examinations will be allowed ONLY in the case of illness or serious tragedy and permission must be obtained for a make-up exam prior to the scheduled examination. The expected range of percentage scores for grades in this course is: A, 91-100; AB, 86-90; B, 75-85; BC, 68-74; C, 55-67; D, 45-54; F, 0-44. This grade scale may be adjusted at any time by the instructor if a different scale is deemed more appropriate for the nature of the course during this particular semester.

This is a demanding course and will require disciplined serious study in order to master the material and obtain an acceptable grade. A minimum of 10 hours per week of study outside of the classroom is needed.

Two Page Article: You will prepare a two-page article on the organic chemistry of a biological process or other topic of interest. Select a topic and clear it with me for approval by Monday, March 10. Only one person in the course may present a particular topic. A list of some possible topics is found on the next page.

Each article is to have the following parts: title, author, main body, and references. Design your article to effectively teach the organic chemistry of your topic to the other students in this course. You may wish to use columns, different fonts, and images to enhance the appearance of your article. Your article is due before midnight on Monday, April 28. Your article needs to be formatted either as a Word document with a ".doc" extension or as a portable document file (.pdf). You then need to submit it at the course D2L site at one of the three discussion topics (nutrition, medicine, and other) at the "Discussions" page.

You may earn up to 15 bonus points for reading and evaluating the articles prepared by other students and then submitting your nominations for 1) most interesting, 2) best designed, and 3) best illustration of chemistry in each of the three topic groups (nutrition, medicine, and other). You will then have a total of nine nominations for an award, three nominated papers in each of three topic groups. All student articles will be available for you to read and evaluate at the D2L site. You will be able to submit your nominations for award winning articles starting on Tuesday, April 29 at the D2L "Discussions" site. **All nominations must be made before midnight, Wednesday, May 7.**

Potential Topics for your Article:

acetaminophen mechanism of action
acrylamide in baked foods
alcohol dehydrogenase
aldolase
aminoacyl-tRNA synthetases
ampicillin
anabolic steroids
antidotes for poisonous war gas
aspirin mechanism of action
base catalyzed RNA cleavage
breath analyzer chemistry
cancer chemotherapy
chiral drugs
cross-linking reactions used in biology
cytochome P-450 chemistry
dioxin
DEAT and how it works
DNA methylases
DNA modification reactions
enzymes with interesting mechanisms
epoxy resins
ethylnitrosourea reaction with DNA
food preservatives
gene machine chemistry
homocysteine
how a particular drug is synthesized
how a particular drug works
hydrazine reaction with DNA
hydrazine reaction with protein
insecticides
iodination of proteins for radio-labeling
isotope effects
Kevlar, nylon, and other polyamides
lysozyme
methylation of DNA by dimethylsulfate (DMS)
nitrosamines in food and health concerns
nonenzymatic peptide synthesis
oxidative damage of DNA (mutation mechanisms)
particular metabolic reactions
penicillin
pepsin
phosphocreatine
polycarbonates
polyesters
polyurethanes
preparation of affinity resins for chromatography
puromycin
ribonuclease A
ribonuclease P
ritalin mechanism of action
role of a particular vitamin
self-splicing introns
spliceosome
sun screen and how it works
tetracycline
thermosetting polymers
trans fats
triosephosphate isomerase
trypsin
valium mechanism of action
vitamin A, B1, etc., choose one

Tentative Lecture Schedule

Date			Lecture	Chapter	Topic
Jan	23	W	1	1	Lewis structures, hybrid orbitals
	25	F	2	1	acids and bases
	28	M	3	2	functional groups, alkanes
	30	W	4	2, 16.5	cycloalkanes, steroids
Feb	1	F	5	3	alkenes
	4	M	6	3	addition of HCl, isoprene and terpenes
	6	W	7	3	
	8	F	8	4	reactions of alkenes
	11	M			**Exam #1** (Lectures 1 → 8)
	13	W	9	4	reactions of alkenes
	15	F	10	4	
	18	M	11	4	reactions of alkynes
	20	W	12	5	aromatic compounds
	22	F	13	5	
	25	M	14	5	substituent effects
	27	W	15	5	
	29	F	16	6	stereochemistry
Mar	3	M			**Exam #2** (Lectures 9 → 16)
	5	W	17	7	alkyl halides
	7	F	18	7	S_N1 and S_N2 reactions
	10	M	19	7	E1 and E2 reactions
	12	W	20	8	alcohols, phenols, and ethers
	14	F	21	8	
					Spring Recess
	24	M	22	8	
	26	W	23	8	phenols, thiols, and sulfides
	28	F	24	9	aldehydes and ketones (names, synthesis, oxidation, and reduction; through 9.4)
	31	M			**Exam #3** (Lectures 17 → 24)
Apr	2	W	25	9	nucleophilic addition reactions
	4	F	26	10	carboxylic acids

Date			Lecture	Chapter	Topic
Apr	7	M	27	10	carboxylic acids
	9	W	28	10	derivatives of carboxylic acids
	11	F	29	10	carbonyl α-H reactivity
	14	M	30	11	α-substitution reactions
	16	W	31	11	
	18	F	32	12	amines
	21	M			**Exam #4** (Lectures 25 → 32)
	23	W	33	13	structure determination
	25	F	34	13	
	28	M	35	13	
	30	W	36	14	carbohydrates
May	2	F	37	14	
	5	M	38	14	
	7	W	39	16	lipids
	9	F	40	16	
	12	M	41		summary
	19	M			Final Exam, 1:00 p.m.