CHE 171: Mechanistic Organic Chemistry I

Syllabus, Autumn Quarter 2002

This syllabus is also posted on my web site-- http://www.depaul.edu/~mdintzne

Meeting Time:
MWF 12:00-1:00 (lecture)
T 11:50-12:50 (quiz section)
M-F 1:00-5:00 (labs)

Instructor:
Dr. Matthew R. Dintzner
Office hours: Tuesday 9:00-11:50 and Thursday 10-12, or by appointment.
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Course Description:

CHE 171 is the first in a sequence of lecture/laboratory courses designed to investigate what organic chemistry is and how it works, by emphasizing the relationship between structure and function of organic molecules. Our primary objective for CHE 171 is to become proficient with the language and fundamental concepts of organic chemistry. Specific objectives and expectations will be made clear prior to each weekly quiz. Everything about this subject is comprehensive, and so it is very important that you do not fall behind with the material. Unlike other courses, it is very difficult to "cram" for organic chemistry at the end of the quarter. The best strategy for success in this course is to stay on top of the material. The schedule is outlined below and we will stick to this as closely as possible. Please read the assigned sections of the texts before you come to class or lab.

Texts: *Organic Chemistry (5th ed.)* by Francis A. Carey (required)
Molecular Model kit (required)
Organic Chemistry Solutions Manual (optional)
Experimental Organic Chemistry (3rd ed.) by Gilbert & Martin (required for lab)
Also required for lab: a bound laboratory notebook and enclosed safety goggles.

Homework: Daily reading assignments are listed in the schedule below. Problems from the text will be suggested at the end of each lecture period. Although these problems will not be collected or graded, it is in your best interest to do them. Working on suggested problems will help you become proficient with the material and prepare for weekly quizzes. If you have questions about any of the assigned problems, please bring them up at the beginning of the next lecture period and we will discuss them as a class.

Quizzes and Exams: There will be one quiz per week, given during the first half hour of the quiz section on Tuesdays (the second half of the quiz section will be used for pre-lab lectures and discussions). I will drop the lowest quiz grade. There will be a final exam for the lecture portion of the course (200 pts.) and a final exam for the lab portion of the course (25 pts.).

Grades: Final grades will be based on a point system, with 800 points as the maximum possible. Letter grades will be based on total points according to ranges shown below:

Quizzes (50 pts each, with 1 drop*)	400 pts.		800-720 pts.	A range
Final Exam	200 pts.		640-719 pts.	B range
Lab Reports (25 pts each, with 2 drops*)	150 pts.		560-639 pts.	C range
Lab Notebook	25 pts.		480-559 pts.	D range
Lab Final Exam	25 pts.		< 480 pts.	F

**Missed quizzes and/or labs that are not turned in at all count as a "0" and cannot be dropped.*

Schedule:

DATE	READING	TOPICS OR EXPERIMENT	✓
Pre-Lab	G/M 1.1-1.11	All the basics. Attend Safety Lecture!	
9/11	Carey 1.1-1.6	Review of General Chemistry.	
9/13	Carey 1.7-1.11	Introduction to Organic Chemistry.	
LAB 1	G/M 3.1-3.3, 2.7, 2.17 and 2.18	Solids: 3.2 Recrystallization (parts A and B) 3.3 Melting Points (parts A and B)	
9/16	Carey 1.12-1.18	Acid-Base reactions and equilibrium.	
9/17	**QUIZ**	**1**	
9/18	Carey 2.1-2.10	Alkanes, sp^3 hybridization, constitutional isomers	
9/20	Carey 2.11-2.15	Nomenclature of alkanes.	

LAB 2	G/M 4.2-4.4, 2.8-2.9, 2.13-2.15	Liquids: 4.2 Boiling Points of Pure Liquids (*miniscale)* 4.3 Simple Distillation (*miniscale)* 4.4 Fractional Distillation (*miniscale)*	
9/23	Carey 2.16-2.19	Physical and chemical properties of alkanes, oxidation and reduction in organic chemistry.	
9/24	**QUIZ**	**2**	
9/25	Carey 2.20-2.23	sp^2 and sp hybridization.	
9/27	Carey 3.1-3.6	Conformational analysis of straight chain and small ring alkanes.	
LAB 3	G/M 5.1-5.3, 2.21, 2.25	Extraction: 5.3 A One-Base Extraction (*miniscale)* 5.3 B Two-Base Extraction (*miniscale)* 5.3 C Acid-Base Extraction (*miniscale)*	
9/30	Carey 3.7-3.14	Conformational analysis of cyclohexanes; bicyclic and heterocyclic systems.	
10/1	**QUIZ**	**3**	
10/2	Carey 4.1-4.6	Functional groups, alcohols and alkyl halides, nomenclature and physical properties.	
10/4	Carey 4.7-4.12	Substitution reactions (S_N1, S_N2), carbocations, energy diagrams of reactions.	
LAB 4	G/M 6.1-6.4, hand-out	Chromatography: 6.2 Separation of Spinach Pigments by TLC 6.3 & hand-out, Separation of Spinach Pigments by Column Chromatography 6.4A Qual. and Quant. Analyses of a Mixture by GLC (GC)	
10/7	Carey 4.13-4.19	Free radical reactions of alkanes.	
10/8	**QUIZ**	**4**	
10/9	Carey 5.1-5.7	Alkenes: nomenclature, E-Z stereoisomers, physical properties, cycloalkenes	
10/11	Carey 5.8-5.12	Elimination reactions, dehydration, E2 and E1 mechanisms, Hoffmann vs. Zaitsev's rule.	
LAB 5	G/M 10.1-10.2	Alkenes: 10.2 A Elimination with KOH (*miniscale)* 10.2 B Elimination with KO*t*-Bu (*miniscale)*	
10/14	Carey 5.13-5.18	Carbocation rearrangements,	

		dehydrohalogenation.	
10/15	**QUIZ**	**5**	
10/16	Carey 6.1-6.7	Hydrogenation of alkenes, electrophilic addition, Markovnikov's rule, carbocation rearrangements.	
10/18	Carey 6.8-6.17	Free radical reactions with alkenes, hydrolysis of alkenes, acid-catalyzed hydration of alkenes, hydroboration-oxidation, halogenation, halohydrins.	
LAB 6	G/M 7.1-7.4, 2.16, 4.6, and 7.6	Stereoisomers: 4.6 (adapted) Isolation of Carvone from Spearmint Leaves or Caraway Seeds by Steam Distillation (also see 2.16 for technique) 7.4 Properties of the Enatiomeric Carvones 7.6 Resolution of 1-Phenylethanamine (start)	
10/21	Carey 6.18-6.22	Epoxidation, ozonolysis, introduction to organic synthesis.	
10/22	**QUIZ**	**6**	
10/23	Carey 7.1-7.4	Enantiomers, chiral centers, symmetry, optical activity.	
10/25	Carey 7.5-7.8	Absolute and relative configuration, Cahn-Ingold-Prelog convention, Fischer projections, properties of enantiomers.	
LAB 7	G/M 7.5-7.6	Stereoisomers: 7.6 Resolution of 1-Phenylethanamine (finish)	
10/28	Carey 7.9-7.14	Stereochemical considerations for reactions, diastereomers.	
10/29	**QUIZ**	**7**	
10/30	Carey 8.1-8.4	Nucleophilic sbustitution: S_N2 mechanism and stereochemistry.	
11/1	Carey 8.5-8.7	Steric effects, nucleophiles and nucleophilicity.	
LAB 8	G/M 14.1-14.5	Nucleophilic Aliphatic Substitution: 14.4 S_N2 Preparation of 1-Bromobutane (*microscale)* 14.5 S_N1 Preparation of 2-Chloro-2-	

		Methylbutane (*microscale)*	
11/4	Carey 8.8-8.11	Nucleophilic Substitution: S_N1, carbocations, stereochemistry, carbocation rearrangements.	
11/5	**QUIZ**	**8**	
11/6	Carey 8.12	Solvent effects on reaction rates.	
11/8	Carey 8.13-8.14	Substitution vs. elimination, sulfonate ester substrates.	
11/11	Carey 8.15	Review and overview of substitution reactions.	
11/12	**QUIZ**	**9**	
11/13	Carey 9.1-9.4	Alkynes: nomenclature, physical properties, structure/bonding.	
11/15	Carey 9.5-9.14	Preparation and reactions of alkynes.	
11/18	Carey 9.5-9.14	Preparation and reactions of alkynes.	
11/19	**LAB FINAL EXAM**	During quiz section.	
11/26	**FINAL EXAM**	11:45-2:00	

Academic dishonesty: Any violation of the academic honesty policy in the classroom is extremely serious. Read the appropriate sections of the Student Handbook for the policy.