

## CHEM 245 Organic Chemistry Lab II Course Syllabus – 2013

**Overall Coordinator: P. A. Wade, Disque 508**

**You should see the Instructor in charge of your lab section for help if needed.**

CHEM 245 is the second course in organic laboratory practices. You will learn more advanced lab skills including how to carry out electrophilic aromatic substitution, redox, Diels-Alder, and Grignard reactions. You will learn how to apply environmentally friendly (green) principles to reactions. You will get to carry out the preparations of alcohol and ketones, reactions which are covered in the CHEM 242 and CHEM 243 lecture courses. Further examination of spectral properties (IR and  $^1\text{H}$  NMR) of organic compounds will be taught. Experience with organic dyes and compounds of biological interest (analgesics, anesthetics, insect repellents) will be gained.

**Required Materials - you need to purchase the following items:**

- 1) Safety goggles and a lab coat.
- 2) Lab manuals: "Organic Chemistry Lab Manual", Third Edition, by P. A. Wade & V. Braz (1<sup>st</sup> or 2<sup>nd</sup> Editions are okay if you have one of them) and "Organic Chemistry Lab Manual Part 2", Third Edition, by P. A. Wade & V. Braz
- 3) a hardbound (not loose-leaf or spiral) notebook (a composition book works well).

### **Course Purpose**

Organic chemistry is an experimental science. To learn the subject well, you must do actual lab work. Organic chemistry is important to many programs of study. It is essential for chemistry majors and biology majors. Other majors (chemical engineering, environmental science, material science, and biomedical engineering) will find organic chemistry highly useful for their developing careers.

### **Course Goals**

After taking CHEM 245 you should be able to:

1. Perform an aromatic nitration and a Friedel-Crafts reaction
2. Oxidize an alcohol and reduce a ketone
3. Understand Grignard syntheses, Diels-Alder reactions, and aldol condensations
4. Understand multiple-step syntheses
5. Set up a reaction with exclusion of water
6. Understand the principles of green chemistry and of reagent face selection

**Grading Scheme** (More detail is given on General Information Handout)

a)	Pre-lab quizzes	10%
b)	Notebook and questions	40%
	(some instructors also require reports)	
c)	Products	20%
d)	Lab technique	15%
e)	Final exam	15%

## Projected List of Experiments

Experiment 1. Biosynthesis of Ethanol from Sucrose	3
Experiment 2. Oxidation – Reduction Chemistry. Conversion of Borneol to Isoborneol	7
Experiment 3. Grignard Synthesis of Triphenylmethanol	12
Experiment 4. Electrophilic Aromatic Substitution. Part I. Aromatic Nitration	17
Experiment 5. Electrophilic Aromatic Substitution. Part 2. Friedel-Crafts Alkylation	21
Experiment 6. The Reaction of 2,4-Hexadien-1-ol with Maleic Anhydride: a Green Tandem Diels-Alder / Lactonization Reaction	25
Experiment 7. Diazotization of Aromatic Amines and Preparation of Azo Dyes	28
Experiment 8. Multi-step Synthesis of Benzocaine (Ethyl 4-aminobenzoate)	33
Experiment 9. Aldol Condensation of Benzaldehyde and Acetone	38
Experiment 10. Acetylation of Glucose	41
Experiment 11. Synthesis of DEET, a Common Insect Repellent	44

### Academic Policies

Plagiarism, cheating, fabrication and other acts of academic misconduct will not be tolerated. For more information, see material in “academic dishonesty” under the “academic policies” tab at the following link:

[http://drexel.edu/studentaffairs/community\\_standards/studentHandbook/](http://drexel.edu/studentaffairs/community_standards/studentHandbook/)

Students with disabilities should see material under the “health and disability services” tab at the following link:

[http://drexel.edu/studentaffairs/community\\_standards/studentHandbook/](http://drexel.edu/studentaffairs/community_standards/studentHandbook/)

If you are registered and wish to drop or withdraw from this course, see the following link:

[http://www.drexel.edu/provost/policies/course\\_drop.asp](http://www.drexel.edu/provost/policies/course_drop.asp)

The list of experiments and/or individual portions of experiments may be modified after the term begins. If such changes are made, your lab Instructor will inform you during class.