

## Chemistry 381: Synthesis and Characterization (Spring 2009)

Erland Stevens

Office: 232 Martin (x2305)

This course has two texts:

*The ACS Style Guide*

Zubrick's *The Organic Chem Lab Survival Manual*.

While this course primarily concerns experimentation and laboratory techniques, the book list suggests that we will be doing quite a bit of writing as well. Writing and experimentation go hand in hand. In the sciences, results must be disclosed, ultimately in publications. Publications require clear and concise writing.

The field of synthesis is huge and far beyond what we could ever hope to cover in a semester. Our goals for this semester are fairly abstract – appreciate the challenges and advancements in synthesis (lecture), synthesize and purify molecules (laboratory), interpret data for structural characterization (laboratory). Currently, the plan is to spend one or two lectures each week on theory and the third “lecture” slot getting things done in lab (TLC, melting point, NMR) and/or preparing for the next experiment.

### Lecture Schedule

Week	Subject	Description
1/12	Basics	SciFinder, ISIS Draw, Spartan, lab reports
1/19	Writing	Sections of a paper, emphasis on the experimental
1/26	Chromatography	TLC, gravity/flash, HPLC
2/02	NMR	$^1\text{H}$ , $^{13}\text{C}$ , 2D experiments, solvents, variable temperature
2/09	MS and IR	Basic ideas for both techniques
2/16	Distillation	Glassware, vacuum/aspiration/atmospheric, GC
2/23	Asymmetry 1	Making single stereoisomers
<b>3/02</b>	<b>No class</b>	<b>Spring break</b>
3/09	Asymmetry 2	Separating single stereoisomers
<b>3/16</b>	<b>Mid-Term</b>	<b>Covers laboratory and lecture content</b>
3/23	Coord. chemistry	18-electron rule, <i>d</i> -orbitals, ligand-field theory
3/30	Catalysis	Theory, turnover, costs, palladium mechanism
4/07	Schlenk lines	Glove box, double manifold, glassware
4/14	Schlenk lines	Glove box, double manifold, glassware
4/21	Green chemistry	Waste handling, waste minimization
4/28	Funding	Types of funding agencies and funding opportunities
<b>5/05</b>	<b>Final</b>	<b>Covers laboratory and lecture content</b>

## Laboratory Schedule

Week	Subject	Features
1/12 1/26	aldol condensation	recrystallization, modeling, J-coupling
<b>1/19</b>	<b>MLK Jr. Day</b>	
2/02 2/09	amine resolution	distillation, NMR shift reagents, stereochemistry
2/16 2/23	hydrazone formation, Fischer indole synthesis, methylation	COSY, NOESY, deuterium-hydrogen exchange
<b>3/02</b>	<b>Spring Break</b>	
3/09 3/16	hydride reduction of a ketone	column, modeling, J-coupling
3/23	Suzuki coupling	catalysis
3/30 4/07	<i>cis</i> and <i>trans</i> Co(III) complexes	recrystallization, UV-VIS, stereochemistry
<b>4/14</b>	<b>Easter Break</b>	
4/21 4/28	ferrocene	sandwich compounds

## Grading

Grades will be determined based on the following break-down.

Item	Percentage
Laboratory Reports	68
Mid-term	12
Final	20
Total	100

Lab reports are a major part of this class. In total, there will be seven reports. Each will be graded based on its content. Other factors including cleanliness of the laboratory and proper maintenance of one's lab notebook may be included in the grade. Each experiment will be worked in pairs, but the lab reports will be written individually. Everyone will also keep a separate laboratory notebook.

## Office Hours

by appointment

## Honor Code

Do not cheat or lie in this class. Report the results that you get in lab.