

Structural Analysis of Organic Compounds

Instructor and Course Description

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Office Hours: T 9-12 AM

Course Description: CHEM 430—This course is designed to introduce the spectroscopic techniques that are used to elucidate the structures of organic molecules of various molecular weights. Some theoretical background will be provided and is necessary, but the emphasis is on solving problems. The course starts with fundamental concepts and techniques learned in sophomore organic chemistry and builds toward state-of-the-art methods used by modern organic and bioorganic chemists. Topics to be covered include: UV spectroscopy, 1-D and 2-D multinuclear NMR, spin-spin (scalar) coupling and chemical shifts, IR spectroscopy, mass spectroscopic techniques, and stereochemical determination.

*And every hour of everyday I'm
 learning more*

*The more I learn, the less I know
 about before*

*The less I know, the more I want to
 look around*

*Digging deep for clues on higher
 ground...*

"Higher Ground" by UB40

Text and Course Materials

Text: Spectroscopic Methods in Organic Chemistry, Hesse / Meier / Zeeh, 2008, 2nd Ed. ISBN: 9781588904881 / 9783131060426.

Recommended Materials: Use of a molecular model set is



strongly encouraged. One will be used to demonstrate concepts throughout the semester.

Course Website: Available on the CHEM 430 page of the instructors website:

<http://chemistry.bd.psu.edu/justik/CHEM430.htm>

All problem sets and study guides will be posted here, as well as answer keys for the exams.

Grading and Course Policies

The following grading scale will be used. If the class average falls below a B-/C+ mark, an adjustment *may* be made for grade cutoffs.

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	75-79
C	70-75
D	60-70
F	Below 60

Exams:

Exam 1:	50 pts
Exam 2:	100 pts
Exam 3:	100 pts
Exam 4:	150 pts
Exam 5:	150 pts
Project 1:	50 pts
Unknown 1	75 pts
Unknown 2	75 pts
Total	750 pts

Academic Integrity Policy:

Penn State and your professor put a very high value on academic integrity, and violations are not tolerated. More information on academic integrity can be found at:

<http://www.pserie.psu.edu/faculty/academics/integrity.htm>

Part 1: Molecular Formulas and Organic Structure

- Mathematics of chemical formulas
- General classes of organic structures
- Theory of spectroscopy

Short Exam 1—In class**Part 2: Mass Spectrometry**

- Ionization methods and experiments
- Molecular ions/isotopic determinations
- Fragmentation patterns

Exam 2—In class**Part 3: Infrared Spectroscopy**

- Methods and Theory
- Functional groups
- Raman and ATR Spectroscopy

Exam 3—In class**Part 4: Ultraviolet and Visible Spectroscopy**

- Methods and Theory
- Woodward-Fieser Rules and Structure

Exam 4—Evening: Correlated Spectroscopy I**Part 5: NMR Spectroscopy**

- Methods and Theory
- Multinuclear methods
- Coupling constants and structure
- Advanced 1-D methods and pulse sequences
- 2-D methods

Exam 5—Evening: Correlated Spectroscopy II**Part 6: Final Projects**

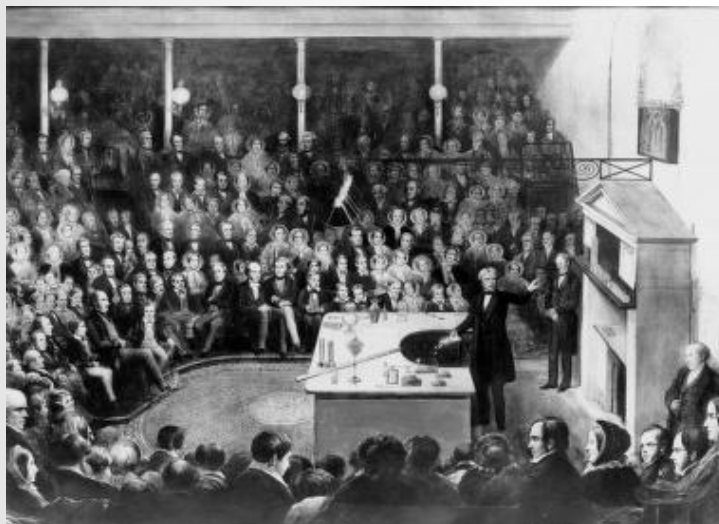
- Journal Assignment and Presentation
- Organic Structure Determination—Unknown 1
- Organic Structure Determination—Unknown 2

Exam dates will be given two weeks in advance.

Course guidelines:

Study Guides will be posted one week before each exam.

It is assumed that you read each set of lecture notes and any relevant chapters before we cover the material and perform the minimum problem sets immediately thereafter.



Absences: Students are responsible for all materials presented in the course as well as for acquiring missed information. Excessive absence, beyond two absences during the term, will result in loss of project points. Excused absences will be handled on an individual basis by the instructor.

It is assumed you **monitor your e-mail daily** for announcements regarding any additional meetings or cancellations.

Electronic Devices: All electronic devices must be off during class or exams. This includes mp3 & CD players, laptop computers and PDAs as well as programmable calculators. You will be allowed only a simple scientific calculator for exams.

Cell phones must be turned off in class.

Workshops: The workshop sessions will be used as a guided exercise for working on problem sets. They will generally be informal peer-led discussions of the material in preparation for the exams, so your participation is required. As the semester progresses this exercise will evolve and change as the course continues to grow to give you the highest quality instruction.

During these sessions it is expected that you regard each other in a professional and respectful manner.

See Dr. Justik if you have any problems—that is why he is here !