Instructor

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Course Description

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.

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
Course Schedule

Introduction: Organic Structures
Chapter 1
• Mathematics of chemical formulas
• General classes of organic structures
• Theory of spectroscopy

Part I: NMR Spectroscopy
Chapters 2 to 6
• Methods and Theory
• Multinuclear methods
• Coupling constants and structure
• Advanced 1-D methods and pulse sequences
• 2-D methods

Part II: Mass Spectrometry
Chapters 7-10
• Ionization methods and experiments
• Molecular ions/isotopic determinations
• Fragmentation patterns

Part III: Vibrational Spectroscopy
Chapters 11 to 12
• Methods and Theory
• Functional groups
• Raman and ATR Spectroscopy

Part IV: Electron Absorption Spectroscopy
Chapters 13-14
• Methods and Theory
• Woodward-Fieser Rules

Grade Scale
The following scale will be used:
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: <60

Distribution: Quizzes 25%, Exams 50%, Projects 25%

Course Policies
Quiz and Exam dates will be given one week in advance; it is assumed you are working daily on the problems in the course.

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!