Spectroscopic Methods in Organic Chemistry
CHEM5321 – Spring, 2019

Instructor: Prof. David F. Wiemer
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Prerequisite: Organic Chemistry 2 (CHEM2220), Advanced Organic Chemistry (CHEM4372) or the equivalent.

Class Time: This course is scheduled for 9:30–10:45 AM on T/Th in E203 CB.

Textbook: The book Spectrometric Identification of Organic Compounds, now in its 8th edition, by Silverstein, Webster, Kiemle, and Bryce is recommended. It contains both reference tables of spectral data and some practice problems. Earlier editions also may be helpful (8th Edition, 2014, ISBN-10: 0470616377; 7th Edition, 2005, ISBN 0471393622). It is a useful book for an organic chemist to have within ready access, and it may be used as a reference during our exams (although a comparable text can be used instead). If you would prefer not to buy one, there are multiple copies in the Department and you may be able to borrow one for the exams.

Two other texts that might be useful can be purchased online. One would be Organic Structure Analysis, 2nd Edition (P. Crews, J. Rodriguez, and M. Jaspars, ISBN 9780195336047; 2009). This is more extensive than the Silverstein book, and probably has too much detail for this course. The other would be Structure Determination of Organic Compounds, Tables of Spectral Data. The most recent (4th) edition of this book was published in 2009 and was authored by Pretsch, Bührmann, and Badertscher (ISBN 3540938095). Earlier editions might also be useful. This book is a compendium of data that provides many examples of spectroscopic data (especially NMR) for various types of compounds. This book does not include practice problems, explanations, or details of theory.

Class Notes: Copies of the course notes (essentially the Powerpoint slides used in class) will be provided for download (in pdf format on ICON) periodically as the semester progresses. These will be made available before they are covered in class, so that students may add written comments to them during the lecture and, ideally, look them over before class. There will be additions and deletions made during the semester in an effort to improve their quality. Some slides will have blank spaces to support use of Socratic method during lecture. Not all of the notes will be covered in depth in class: some parts will be considered briefly, while others may simply be assigned as reading or reference material.

Office Hours: Formal office hours will be held from 1:30–2:20 PM on T/Th in E531 CB. Questions also will be taken during class as time permits, immediately after class, or by appointment. E-Mail should be used to make appointments or for very brief questions.
Content: This course will cover the most commonly used spectroscopic and spectrometric techniques in organic structure elucidation, with the exception of X-ray crystallography. The vast majority of course time will be spent on NMR (>75%) and MS methods, their practical applications, and interpretation of data generated using these techniques. Exam I will focus on interpretation of standard $^1$H and perhaps some $^{13}$C NMR data. Exam II will build upon earlier work by bringing in more sophisticated NMR techniques (including 2D NMR). The Final Exam will be comprehensive, and will include problems of the types found on Exams I and II, along with coverage of MS and additional topics as time permits.

Exams: All examinations will be closed book, except that a reference work (e.g. Silverstein) may be used. All other materials (e.g. books, notebooks, summary sheets, computers, backpacks, purses, phones, etc.) must be left at home or brought to the front of the room before the exam begins. Tests will be of an essay type, where your answers are written in an exam booklet provided.

Three two-hour exams will be scheduled, two mid-semester and one during final exam week.

- After $^1$H NMR (an evening ~Feb 22nd, 7:00 – 10:00 PM?)
- After all NMR (an evening ~April 2nd, 7:00 – 10:00 PM?)
- Week of May 6th to 10th (to be announced mid-February)

Dates for the two midterms will be determined by our progress through the material, but they are tentatively scheduled for approximately Feb. 22nd and April 2nd, as noted above. Under current UI policies, the final examination date and time will be announced during the first half of the semester by the Registrar. The final examination date and time for this course will be announced in class once it is known. Do not make any end-of-the-semester travel plans until the final exam schedule is made public by the Registrar.

Grades: Final grades will be based on exam performance. The two mid-term exams will each be worth 30 percent of the final grade, while the final exam will be worth ~40 percent. Grades will be curved depending on the performance of this year’s class.

Each student will be expected to contribute three spectroscopy problems over the course of the semester, one for each of the three sections of the course, by dates to be announced in class. These problems should be e-mailed to the instructor as a PDF file or ppt slide. Efforts will be made to solve many in class before any answers are posted, so that they can be used to maximum effect in developing problem-solving skills and experience, and to provide exposure to different kinds of situations and data sets. These problems must be ones where the student knows the answer, i.e. no unknowns from your research! Collected sets of these problems will be distributed to allow more practice. Exams from last year also will be provided via ICON, along with their answer keys.
DEPARTMENTAL CONTACT INFORMATION: Prof. James B. Gloer, DEO, E331 CB; or through Lindsay Elliott, Administrative Services Coordinator, E331 CB, 319-335-0200.

REGRADING OF EXAMS: If you believe a mistake has been made in grading your exam, you may turn this in for reconsideration. Write on the cover the question to be regraded, with a one sentence explanation of what you believe was incorrectly graded, and drop your exam in the Chemistry Center. Exams for regrading must be submitted within one week of the time they are first returned to you.

ADMINISTRATIVE HOME: The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at http://clas.uiowa.edu/students/handbook.

ELECTRONIC COMMUNICATION: University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondence. (Operations Manual, III.15.2, k.11).

ACCOMMODATIONS FOR DISABILITIES: A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

ACADEMIC HONESTY. All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

MAKING A SUGGESTION OR A COMPLAINT: Students with a suggestion or complaint should first visit the instructor, then the course supervisor, and then the departmental DEO. Complaints must be made within six months of the incident. See the CLAS Student Academic Handbook.

UNDERSTANDING SEXUAL HARASSMENT: Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

REACTING SAFELY TO SEVERE WEATHER: In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety the Department of Public Safety website.