

## Chemistry 527: Chemical and Biochemical Characterization Methods Spring 2018

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Office Hours: MWF 1:00 – 2:00 pm, TR: 11:30 am – 12:30

Lectures: Wednesday 6:30-9:35 pm Room: STC 123

Text: Spectrometric Identification of Organic Compounds, 6<sup>th</sup> Edition, Robert M. Silverstein and Francis X. Webster. ISBN: 0-471-13457-0. The 7<sup>th</sup> edition is the newest edition, but the 6<sup>th</sup> edition is acceptable.

The purpose of this course is to introduce the student to the subject of Spectroscopy as it relates to the identification and characterization of organic and biological compounds. This semester we will cover <sup>1</sup>H-, <sup>13</sup>C-, and variable temperature NMR spectroscopy. We will also cover several advanced NMR techniques like NOE, COSY, HETCOR, and HMQC. We will cover the basic principles of IR, Uv/Vis, mass spectroscopy, CD spectroscopy, fluorescence spectroscopy, and polarimetry.

### Grading

There will be several take-home problem sets assigned throughout the semester that will constitute 25% of the grade. You are encouraged to form study groups and to work together on these problems. There will be two exams (25% each) and a final exam (25%), which will be in part take-home (spectroscopy problems) and part in-class. The final letter grade will be based on a standard scale 90-100% A, 80-89% B, 70-79% C, 60-69% D, and below 60% F. The grades may be curved, if warranted. April 2, 2018 is the last day to drop the course and receive a drop.

There will be absolutely no make-ups for exams. If you miss an examination, you will be assigned a zero for that assignment or the points will be placed on the final exam making your final exam a greater portion of your grade. Problem sets not submitted on time may receive a grade of zero.

### Tentative Schedule

February 7 – Introduction to spectroscopy, Mass Spectrometry  
February 14 – Mass Spectrometry  
February 21 – IR Spectroscopy  
February 28 – UV/Vis Spectroscopy, Theory of <sup>1</sup>H-NMR spectroscopy – nuclear spin flip, chemical shift  
March 7 – First ½ of the class: Theory of <sup>1</sup>H-NMR spectroscopy – correlation tables, integration, spin-spin splitting, coupling constants, Second ½ of the class: **Exam 1, IR and UV/vis Spectroscopy and Mass Spectrometry**  
March 14 – No class – Spring Break  
March 21 – Theory of <sup>1</sup>H-NMR spectroscopy – alcohols and related, Theory of <sup>13</sup>C-NMR Spectroscopy, DEPT  
March 28 – Correlation NMR, 2D-NMR (COSY, HETCOR, HMQC)  
April 4 – NMR of <sup>19</sup>F, <sup>31</sup>P, <sup>15</sup>N  
April 11 – Chirality, NMR of chiral compounds  
April 18 – Polarimetry, Fluorescence spectroscopy  
April 25 – **Exam 2, NMR spectroscopy**  
May 2 – Fluorescence spectroscopy, Circular Dichroism spectroscopy  
May 9 – Final examination

## Course Objectives

By the end of the semester I intend for my students to have realized a number of objectives.

1. Know how to determine the structure of an organic molecule using spectroscopic techniques such as NMR, IR, UV/vis and MS.
2. Know how to interpret NMR, IR, UV/Vis and MS data.
3. Understand the theory behind several spectroscopic techniques such as NMR, IR, UV/vis and MS.

**Student Conduct Policy:** All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student's Guidebook, Policies and Procedures, Conduct, TAMU-Commerce Procedure 13.02.99.R0.06). Any student engaging in disruptive behavior will be dismissed from class on the first offence. A second offence may constitute dismissal from the course with a failing grade.

**Cheating and other Breaches of Academic Conduct:** Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the Code of Student Conduct section of the Student's Guidebook A&M-Commerce Procedure 13.99.99.R0.10.

**Students with Disabilities:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 162, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148, StudentDisabilityServices@tamuc.edu

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**Campus Concealed Carry:** Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to (<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>) and/or consult your event organizer). Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.