Spectroscopic Methods/Spectroscopic Methods and Analysis of Spectra

Syllabus

The Department of Chemistry and Biochemistry

CHEM 4330/6330/8330

The University of Toledo

Spring 2018

Lecture: T, H  8:00 – 9:50 am  Memorial Field House 2210
Instructor: Steve Sucheck, Ph.D. Chemistry, University of Virginia
Office Hours: T, H  10:00 am - 11:30 am
Phone: 419-530-1504
E-Mail: Steve.Sucheck@UToledo.Edu
Faculty Office: WO 3276
Credit Hours: 4

COURSE/CATALOG DESCRIPTION

CHEM4330. A comprehensive study of theory and instrumentation. Applications of spectroscopic methods including spectral interpretation. Topics include a study of absorption, emission, Raman, NMR, ESR, mass spectrometry, and related subjects.

CHEM6330/8330. A comprehensive study of theory and instrumentation. Applications of spectroscopic methods including spectral interpretation. Topics include a study of absorption, emission, Raman, NMR, ESR, mass spectrometry, and related subjects. Important methodology and strategy in organic synthesis including disconnection and retrosynthetic analysis.

COURSE STRUCTURE

Lecture:
• The concepts covered in this course will be exclusively communicated through lecture. Through lecture you will be provided with examples of what is expected of you.
• Attendance is expected and you are responsible for all material, and problems covered in class.
• Lecture outlines will be available on Blackboard
• The attached schedule will inform you regarding to what topic we are covering
• In consideration for your fellow students, please arrive on time and turn off your cell phone.

Homework:
• Homework assignments will be periodically assigned at the beginning of lecture.

STUDENT LEARNING OUTCOMES

- Understand fundamental principles of UV-VIS, FT-IR, FT-NMR, GC/MS and other techniques for probing chemical structure
- Ability to apply this knowledge on sample problems.
- Ability to elucidate a molecular structure from spectral data provided.

PREREQUISITES AND COREQUISITES:
Prerequisites: None

REQUIRED TEXTS AND ANCILLARY MATERIALS:
Spectroscopic Methods/Spectroscopic Methods and Analysis of Spectra

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B. Supplements: Available from Amazon


Molecular Models: HGS Molecular Structure Set Model C.

TECHNOLOGY REQUIREMENTS

Blackboard is a course management system provided by the University of Toledo.

- Lecture outlines will be available on this site. The system also permits you to check your grades at any time and to email your instructor or other students in the class.
- The Blackboard site can be accessed at https://blackboard.utdl.edu/ Your access code is your UTAD user name and password.

UNIVERSITY POLICIES

Policy Statement on Nondiscrimination on the basis of Disability (ADA). The University is an equal opportunity educational institution. Please read The University’s Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.

ACADEMIC ACCOMMODATIONS

The University Of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.

ACADEMIC POLICIES

Exam Absence Policies: Students who will not be able to take an exam at the scheduled time due to an irresolvable conflict with a major responsibility must provide some written documentation to verify the conflict. This situation may occur for students on official university business, including athletes. The exam will be given at another arranged time. Approval must be obtained before the scheduled test date.

Students who do not take an exam due to illness, car accident, and death in the family or similar extreme circumstance must inform their instructor of their difficulties within 24 hours of the exam. These difficulties must also be documented by a physician's note, an accident report, pastor’s note, etc. Contact information for the police department, pastor, etc. must be included on the note or report. A voice mail or email message
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within 24 hours of missing the exam is also required: 419-530-1504. In all other circumstances, a missed exam will result in a grade of 0. Exams cannot be excused for personal reasons.

Academic Dishonesty: You should read the university’s policy on Academic Dishonesty found at http://www.utoledo.edu/catalog/2000catalog/admissions/academic_dishonesty.html Violation of this policy can result in a course grade of F. You may not cover your eyes in any way during an exam, this includes wearing any type of hat during an exam that shields the eyes. Do not cover your eyes or sit in such a way that you are facing another person. Please note, you can/may be asked/required to move your seat during an exam.

COURSE EXPECTATIONS

It is expected that you be seated and ready to start class at 8:00 a.m. and that you remain seated until the end of class. Arriving late is disruptive to other members of the class.

Examinations are given as listed on the schedule. Excused absences will be given only to students who miss a midterm exam under the conditions listed below. If an excuse is acceptable, you will be given a makeup exam. The final exam cannot be excused. All exams will be based on the lecture notes, assigned problems and assigned readings (textbook and journal articles).

- There will be two mid-term examinations (100 points each) on 2-22-2018, and 04-3-2018.
- The take home final exam (100 points) for the course will be handed on Thursday April 26th and must be returned by Tuesday, May 1th, 2018 by 10:00 a.m.

GRADING POLICIES

Course Points

The following is the distribution of possible points in the course:

- Homework Assignments 30 pts
- In class Presentation 10 pts
- Midterm Exams 2 @ 100 points each
- Final Exam 100 pts

Total: 340 pts

Drop, Withdrawal and Incomplete Grades

Course drop and withdrawal procedures have been set by the University faculty. Dropped courses do not appear on your transcript. The deadline for dropping is January 30, 2018. If you are in a course after that date, there will be a grade on your transcript (A-F, W, or Incomplete). You may withdraw from the course and receive a grade of W. The deadline for withdrawal is March 30, 2018. W’s do not affect your GPA. For both dropping the course or withdrawing you should go to the Registrar's Office in Rocket Hall. You do not need your instructor’s permission for either process. Please note that course registration changes might change your financial aid.

On two occasions during the term, instructors are asked to report student attendance. These reports can affect your financial aid, so you will want to be sure that you are in attendance for all classes. However, you will remain enrolled in the class independent of these reports. That is, you remain registered for the class and will receive a final grade unless you take the action of dropping (by January 30th) or withdrawing (by March 30th). The former grade of Instructor Withdrawal (IW) no longer exists.

A course grade of Incomplete is given only to those who have completed all but a small percentage of course
COMMUNICATION GUIDELINES
You are welcome to communicate with your Professor during office hours or by email. I will attempt to respond to emails within 24 h of receiving the email. I receive multiple emails I may send out a mass email via Blackboard rather than reply directly to your queries. You will need to use your university email account. You are encouraged to seek answers to your own questions on your own by asking classmates or using the discussion board in Blackboard. Remember to be professional when sending email and communicating electronically.

STUDENT SUPPORT SERVICES
Make note of the instructor's office hours and use them. Also, the Chemistry Department has a Help Center located in Bowman Oddy 2043. Graduate Teaching Assistants are available throughout the day to assist you with your problems. The help center is usually staffed from 8am to 8pm Monday – Thursday and 8am – 4pm on Fridays.

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A course grade of Incomplete is given only to those who have completed all but a small percentage of course requirements for an acceptable reason.

COURSE SCHEDULE (TENTATIVE)
The table below will give you a general idea of our pace throughout the course. Be sure to note announcements which may revise this schedule. BE SURE THAT YOUR TRAVEL AND OTHER PLANS DO NOT CONFLICT WITH THIS SCHEDULE – INCLUDING THE FINAL EXAM.
<table>
<thead>
<tr>
<th>Lect.</th>
<th>Dates</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>January 16</td>
<td>Mass Spectroscopy</td>
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<td>2</td>
<td>January 18</td>
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<td>3</td>
<td>January 23</td>
<td>Fragment Interpretation</td>
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<td>January 25</td>
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<td>5</td>
<td>January 30</td>
<td>Vibration Spectroscopy: Infrared and Raman spectroscopy</td>
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<td>6</td>
<td>February 1</td>
<td>Group Absorptions, Interpretation</td>
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<td>7</td>
<td>February 6</td>
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<td>8</td>
<td>February 8</td>
<td>Electronic Absorption Spectroscopy: UV-Vis</td>
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<td>9</td>
<td>February 13</td>
<td>Polarized Light, Chirality, ORD and CD</td>
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<td>10</td>
<td>February 15</td>
<td>Group Absorptions</td>
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<td>11</td>
<td>February 20</td>
<td>Review</td>
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<td>12</td>
<td>February 22</td>
<td><strong>Exam 1</strong></td>
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<td>13</td>
<td>February 27</td>
<td>Fluorescence Spectroscopy</td>
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<td>14</td>
<td>March 1</td>
<td>( ^1 \text{H} ) N.M.R: and ( ^13 \text{C} ) N.M.R: Introduction: Chemical Shift</td>
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<td>15</td>
<td>March 6 SB</td>
<td><em>No Class: Spring Break</em></td>
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<td>16</td>
<td>March 8 SB</td>
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<td>17</td>
<td>March 13</td>
<td>Coupling</td>
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<tr>
<td>18</td>
<td>March 15</td>
<td>Spin Systems; Interpretation; Topic Relationships</td>
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<tr>
<td>19</td>
<td><strong>March 20</strong></td>
<td>1H Decoupling, Nuclear Overhauser Effect <strong>guest</strong></td>
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<td>20</td>
<td>March 22</td>
<td>Polarization Transfer and DEPT</td>
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<tr>
<td>21</td>
<td>March 27</td>
<td>Coupling</td>
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<tr>
<td>22</td>
<td>March 29</td>
<td>Correlation N.M.R: homonuclear shift correlation-COSY</td>
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<tr>
<td>23</td>
<td>March 29</td>
<td>COSY</td>
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<td>24</td>
<td><strong>April 3</strong></td>
<td><strong>Exam 2</strong></td>
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<td>25</td>
<td>April 5</td>
<td>INADEQUATE, 2D-NOESY, ROESY</td>
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<tr>
<td>26</td>
<td>April 10</td>
<td>Heteronuclear shift correlation-HMBC</td>
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<tr>
<td>27</td>
<td>April 12</td>
<td>COLOC, RELAYED COHERENCE TRANSFER</td>
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<td>28</td>
<td>April 17</td>
<td>Mosher Chemistry and NMR</td>
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<tr>
<td>29</td>
<td>April 19</td>
<td>Student In-Class Presentations of Spectroscopic Data (~5-10 min each)</td>
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<td>30</td>
<td>April 24</td>
<td>Student In-Class Presentations of Spectroscopic Data (~5-10 min each)</td>
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<tr>
<td>31</td>
<td>April 26</td>
<td>Student In-Class Presentations of Spectroscopic Data (~5-10 min each) Take home final</td>
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<tr>
<td>32</td>
<td>May 1</td>
<td>Final Exam Due: Tuesday 10:00 a.m.</td>
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