Molecular Spectroscopy
Department of Physical and Environmental Sciences
Maymester 2015

A. COURSE INFORMATION

Course number/section: CHEM. 4490.001
Class meeting time: MTWR 12:30-3:45 PM
Class location: TBD

B. INSTRUCTOR INFORMATION

Instructor: Dr. Mark A. Olson
Office location: CS 210
Office hours: MTWR 3:45-4:45 PM & F by appointment
Telephone: 1-361-825-3293
e-mail: mark.olson@tamucc.edu
Appointments: confirm all appointments to meet with me via email

C. COURSE DESCRIPTION

The course is taught at an advanced undergraduate/first-year graduate level with the curriculum focusing on the spectroscopic methods of molecular structure determination. The course aims to present foundational theoretical concepts of different molecular spectroscopy techniques including nuclear magnetic resonance, infrared, ultraviolet-visible, and mass spectrosopies and how these techniques are used to interpret spectra of unknown analytes. This includes basic modes of absorption and emission, qualitative and quantitative uses and potential problems and limitations. The course has been designed for students who have completed organic chemistry II lecture and laboratory.

D. PREREQUISITES AND COREQUISITES

Prerequisites and Corequisites
CHEM-3411 is required.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES


Supplies: Graphing Calculator is highly recommended

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that
describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Interpret infrared spectroscopy spectra of unknown compounds.
2. Interpret mass spectrometer spectra of unknown compounds.
3. Interpret both 1-dimensional and 2-dimensional nuclear magnetic resonance spectra of unknown compounds.
4. Deduce the full chemical structure of unknown organic molecules using multiple spectra and provide annotated molecular peak assignments on the spectra in support of the full molecular structure assignment.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Lecture materials will be delivered via hand written notes by the Professor with supplementary materials handed out to the students.

H. MAJOR COURSE REQUIREMENTS AND GRADING

There will also be three regular exams and a final exam. The regular exams are increasingly comprehensive and will cover the material that has been covered in class up to the date of the examination and the final is also comprehensive. The average of the four exam grades will determine the lecture grade. Final letter grade (X) for the lecture course will be as follows: A = X ≥ 90; B = 89 ≥ X ≥ 80; C = 79 ≥ X ≥ 70; D = 69 ≥ X ≥ 60; F = X < 60.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>GRADE</th>
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<tr>
<td>Daily Quizes</td>
<td>8 @ 12.5 pts each</td>
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<tr>
<td>Examination</td>
<td>2 @ 100 pts</td>
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<td>TOTAL FOR LECTURE GRADE</td>
<td>300 pts</td>
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I. COURSE CONTENT/SCHEDULE

The schedule below is a preliminary outline of the maymester. It is your responsibility to keep up with changes to this schedule. The reading and problem assignments that will be assigned in class should be completed before the next class meeting. Failure to stay current on reading and problem assignments will greatly affect your ability to keep up during lecture and, therefore, will have an indirect effect on your grade in this course.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Molecular Formula</td>
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<tr>
<td>1</td>
<td>Infrared Spectroscopy</td>
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<tr>
<td>1</td>
<td>NMR Spectroscopy- Part I</td>
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<tr>
<td>1</td>
<td>NMR Spectroscopy- Part II</td>
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<td>1</td>
<td>NMR Spectroscopy- 2D NMR</td>
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<tr>
<td>2</td>
<td>Advance NMR Techniques</td>
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<tr>
<td>2</td>
<td>Midterm (Day 7)</td>
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<tr>
<td>2</td>
<td>UV-Vis Spectroscopy</td>
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<tr>
<td>2</td>
<td>Mass Spectroscopy</td>
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<td>2</td>
<td>Final Exam</td>
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Exam Schedule
Midterm Exam May 26th
Final Exam : May 29th

J. COURSE POLICIES

Attendance/Tardiness
I expect students to attend every class meeting. Failure to attend class may affect your performance on scheduled examinations. Lecture notes will only be provided during lecture and will not be repeated in the event that a student fails to attend at the scheduled meeting time. Changes to the course content and schedule will be announced during lectures.

Late Work and Make-up Exams
Students with a university approved scheduled absence (athletics, military duty, etc.) MUST contact the instructor in advance of the scheduled absence. Exams may be taken early in those specific cases. Students who do not arrange to take exams ahead of time will not be eligible for this special consideration. A written excuse from the university department involved or the Office of the Dean of Students is required. Exam taken outside class will not be multiple choice and it will not include any bonus points. Bring your university picture ID to all lecture exams. If an exam date is missed and the student cannot fulfill the above requisites for excuse, an exam grade of 0 will be recorded. Providing a student with an
opportunity to make up a unexcused missed examination will remain at the sole discretion of the Professor. NO STUDENT WILL BE ADMITTED TO THE EXAMINATION AFTER THE FIRST EXAM-TAKER HAS LEFT!

Extra Credit
The addition of extra credit to examinations or for individuals will remain at the sole discretion of the professor.

Use of Electronic Devices during Exam: Any use of an electronic device (PDA, Cell Phone, MP3 player, CD player, computer …) during an exam is strictly prohibited. Any use of such a device will be considered an attempt to cheat on the exam and will result in a grade of zero on the exam. In addition, more severe actions may also be considered. Calculators may be allowed on exams when needed, but only for mathematical operations. The use of programmable calculators to store or retrieve information during an exam will be considered an attempt to cheat on the exam. Also, if a calculator is discovered to have saved programs or information that could be used as an unfair advantage on the exam, this will be considered an attempt to cheat on the exam.

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at [http://catalog.tamu.edu/content.php?catoid=10&navoid=313#Academic_Integrity](http://catalog.tamu.edu/content.php?catoid=10&navoid=313#Academic_Integrity)

- **Classroom/Professional Behavior**
  The student is expected to be on time and attend every class. If absent, it is the responsibility of the student to obtain missed information from a classmate. Missed information includes not only lecture notes, but also any possible information regarding syllabus changes. The student is expected to arrive on time prepared to take notes.

  Before you enter the lecture hall turn OFF your cellular phone! Beepers must also be turned off or put on silent mode. Electronic interruptions absolutely will NOT be tolerated!

  All students are expected to follow proper classroom behavior and treat the other students and the instructor with respect. If a student’s actions or behavior is deemed disruptive to the class by the instructor, the students will be asked to leave the class for that day.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do.
Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must be submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar for the last day to drop a course.
(http://www.tamucc.edu/academics/calendar/)

• Grade Appeals (College of Science and Engineering)
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures.

These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• Disability Services
Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to http://disabilityservices.tamucc.edu/

ACADEMIC ADVISING: The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. The College's Academic Advising Center is located in Center for Instruction room 350. Please choose the advisor who corresponds to your major (or potential major). Contact the front desk at (361) 825-3928, to schedule an appointment. Meetings are by appointment only; advisors do not take walk-ins. Please call the Advising Center to check availability and ensure a minimal wait.
GENERAL DISCLAIMER
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.