The University of Iowa
The College of Liberal Arts and Sciences

Department of Chemistry

Title of Course: CHEM 5434 : Molecular Spectroscopy (ID: CHEM:5434:0001)

Spring Semester, 2021

Building: Room Number E264CB
Class hours: MWF 11:30 am – 12:20 pm
Lectures: Hybrid (online plus face-to-face)
Zoom link for lectures / walk-in hours: https://uiowa.zoom.us/j/98395441537

Some of the policies relating to this course (such as the drop deadline) are governed by its administrative home, the College of Liberal Arts and Sciences, 120 Schaeffer Hall.

Instructor
Office location: 118 IATL
Walk-in hours: MWF 2:00 – 3:00 pm [3 hrs / wk.] ZOOM Only Students are encouraged to utilize walk-in hours to discuss course content, course material, exams, assignments, literature or any concerns they might have. If you prefer a more personal discussion or if you are unable to attend my walk-in hours, I am also available by appointment – please send an email to make an appointment.
E-mail: aditi-bhattacherjee@uiowa.edu (primary contact)

DEO:
Prof. Leonard MacGillivray
E555 CB, Department of Chemistry
Phone: +1 319 335 3504
Email: len-macgillivray@uiowa.edu

Description of Course
Molecular spectroscopy is arguably the longest standing toolkit utilized by chemists, in general, and physical chemists, in particular. In this course, we will understand traditional and advanced spectroscopic methods pertaining mainly to electronic and vibrational spectroscopies. Molecular rotational spectroscopy will be also touched upon for completeness. Basic concepts in quantum mechanics and group theory required to understand and apply the content will be reviewed. If time permits, the syllabus will cover advanced spectroscopic methods using ultrashort pulses.

Learning Objectives
To learn important concepts in molecular spectroscopy and applied quantum mechanics. To apply learnt concepts to scientific methodologies and the literature.

Texts
Required text or materials
Demtroder: Molecular Physics
Bernath: Spectra of Atoms and Molecules

Reference Materials
Herzberg: Spectroscopy
Harris Bertolucci: Symmetry and Spectroscopy
McHale: Molecular Spectroscopy
Cohen-tannoudji: Quantum Mechanics
Hamm and Zanni: Concepts and Methods of 2D Spectroscopy

Readings Available on ICON: Will be made available on the course website a few hours after class

Exams and Percentage of Final Grade
Assignments: 20% (5-6 assignments)
Class Participation: To be noted but not graded
Midterm exam: 40%
Final exam: 40%
There will be 5-6 graded assignments due at the beginning of class on the date due. Please read about academic honesty policy below concerning copied work. Discussion of homework problems is encouraged, but the written work must be independently done. Late assignments (< 1 week) will be accepted with a point penalty.

If time permits, we will include literature presentations of breakthrough papers in spectroscopy that you will have a chance to choose and present. This could be made into one of your assignments.

Resources for Students
Students will find the Writing Center and the Speaking Center very useful for this course; the Tutor Iowa site is also very valuable for students seeking extra help:

Writing Center: https://writingcenter.uiowa.edu/
Speaking Center: https://speakingcenter.uiowa.edu/
Tutor Iowa: https://tutor.uiowa.edu/

Calendar of Course Assignments and Exams
Detailed reading assignments, other assignments, and exams should be noted on a calendar of assignments. Calendar headings highlighting topics or ideas studied each week can be very helpful to students. It is also helpful for students to have an evaluated assignment before the third week of the class in order to provide explicit course expectations. Also, students are more likely to participate and attend a class when graded assignments occur throughout the semester on a regular basis.

College of Liberal Arts and Sciences: Information for Undergraduates

Absences and Attendance
Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing the absence policies for their courses, which will vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, unavoidable circumstances, or University authorized activities (https://clas.uiowa.edu/students/handbook/attendance-absences). Students may use this absence form to communicate with instructors: https://clas.uiowa.edu/sites/default/files/ABSENCE%20EXPLANATION%20FORM2019.pdf

Academic Integrity
All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty. Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through the UI email address (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

Accommodations for Disabilities
UI is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national
origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity (diversity.uiowa.edu).

**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 must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see https://osmrc.uiowa.edu/.

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All undergraduates enrolled in courses offered by CLAS have in essence agreed to the College's Code of Academic Honesty. Academic misconduct affects a student's related grade and is reported to the College which applies an additional sanction including suspension. Outcomes about misconduct are communicated through UI email (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

**Accommodations for Disabilities**
UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as a mental health, attention, learning, vision, and a physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at https://sds.studentlife.uiowa.edu/.

**Administrative Home of the Course**
The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other UI colleges may have different policies for courses offered by that college. CLAS policies may be found here: https://clas.uiowa.edu/students/handbook.

**Classroom Expectations**
Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the Code of Student Life (https://dos.uiowa.edu/policies/code-of-student-life/). This includes related UI policies and procedures that all students have agreed to regarding the COVID-19 pandemic. Particularly, each student must wear a face mask when in a UI building, including a classroom. The density of seats in classrooms has been reduced, and in some instances, this will allow 6 feet or more of distance while other cases, it may be less. Regardless, wearing a face mask and maintaining as much distance as is possible are vital to slowing the spread of COVID-19. In the event that a student disrupts the classroom environment through the failure to comply with a reasonable directive of an instructor or of the University, the instructor has the authority to ask that the student to leave the space immediately for the remainder of the class period. Additionally, the instructor is asked to report the incident to the UI Office of Student Accountability, with the possibility of additional follow-up with the student. Students who need temporary alternative learning arrangements (TALA) for a future semester related to COVID-19 should visit this website for more information: https://coronavirus.uiowa.edu/temporary-alternative-learning-arrangements-tala.

**Class Recordings: Privacy and Sharing**
Some sessions of a course could be recorded or live-streamed. Such a recording or streaming will only be available to students registered for the course. These recordings are the intellectual property of the faculty, and they may not be shared or reproduced without the explicit written consent of the faculty member. Students may not share these sessions with those who are not enrolled in the course; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and in some cases is a violation of the Federal Education Rights and Privacy Act (FERPA).

**Communication and the Required Use of UI Email**
Students are responsible for official correspondences sent to the UI email address (uiowa.edu) and must use this address for all communication within or with UI (Operations Manual, III.15.2).

**Complaints**
Students with a complaint about an academic issue should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to the College of Liberal Arts and Sciences. See this page for more information: https://clas.uiowa.edu/students/handbook/student-rights-responsibilities.
Final Examination Policies
The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals with a few exceptions made for particular types of courses such as labs or off-cycle courses: [https://registrar.uiowa.edu/final-examination-scheduling-policies](https://registrar.uiowa.edu/final-examination-scheduling-policies).

Nondiscrimination in the Classroom
The University of Iowa is committed to making the classroom a respectful and inclusive space for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited in MyUI to optionally share the names and pronouns they would like their instructors and advisors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity ([https://diversity.uiowa.edu/eod; +1 319 335-0705 or](https://diversity.uiowa.edu/eod; +1 319 335-0705 or [diversity.uiowa.edu))

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