

Institutional Name- University of Wisconsin- Madison

Syllabus for Chemistry 623

Experimental Spectroscopy- This 2-credit class meets each week for two 50-minute lectures. Over the course of the semester, students are expected to do at least 90 hours of learning activities, which includes class attendance, reading, studying, preparation, problem sets, and other learning activities. The course is based on a complete set of notes, research publications, and computer programs that simulate fundamental spectroscopic principles. Python is required for all homework.

Course Description- The theory behind current spectroscopic methods employed in chemical analysis with applications in atomic and molecular absorption spectroscopy, infrared and Raman vibrational spectroscopy, fluorescence and light scattering. **Requisites:** Chem 562 or consent of instructor

Course Designation: Breadth - Physical Science. Course counts toward the Natural Science requirements.

Instructional mode: face-to face

Level – Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Course Instructor- Professor John C. Wright, office 3209 Chemistry, Office Hours 10-11 AM on Mondays and Tuesdays, phone is 608-262-0351, wright@chem.wisc.edu.

Course Website URL- <https://canvas.wisc.edu/courses/76146>

Two weekly lectures- 8:50-9:40 AM on Tuesday and Thursday in room 2372

Course objectives- This course's objectives are to present complete coverage of all of the topics that are required for a Ph.D. level experimental spectroscopist. The course covers the nature of the electronic and vibrational spectra of atoms, molecules, and materials; the nature of light; a quantitative and fundamental theoretical treatment of light-matter interactions; and how they provide a complete and unified description of all spectroscopic properties; a rigorous treatment of experimental optics, diffraction, interference, monochromators, conventional light sources, lasers, detectors, and electronics. The course requires students to quantitatively master the theoretical foundations underlying the topics listed above using Python software.

Course Outcomes- Students finishing this course will have the knowledge and skills to perform state-of-the-art spectroscopy.

Requirements and Evaluation- Students will do weekly assignments that require development of theoretical simulations of spectroscopic theory and experimental methodologies, and read and analyze current spectroscopic research publications. Students will deliver their work to the course website dropbox, present their work to the class at weekly homework discussion sections and the individual students will grade their own work.