# ASTROCHEMISTRY LECTURE AND LABORATORY COURSES AT THE UNIVERSITY OF ILLINOIS: APPLIED SPECTROSCOPY

DAVID E. WOON, *Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL, USA*; BENJAMIN J. McCALL, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL, USA*.

The Department of Chemistry at the University of Illinois at Urbana-Champaign offers two courses in astrochemistry, one lecture (Chem 450) and one laboratory (Chem 451). Both courses present the opportunity for advanced undergraduate and graduate students to learn about various spectroscopic concepts as they are applied toward an exotic subject, astrochemistry. In the lecture course, each student devotes a substantial fraction of the course work to one of the known astromolecules, building a wiki page for it during the semester, presenting a brief oral description about it in class, and then finally writing a paper about it. The course covers electronic, vibrational, and rotational spectroscopy, along with Einstein coefficients, line widths, and the interpretation of actual astronomical spectra. It also covers relevant reactions and reaction networks. Students learn to use pgopher for modeling rotational spectra. The lab course focuses on the methylidyne radical (CH). It begins with its chemistry and spectroscopy and then moves on to laboratory study of its electronic spectrum as observed in a butane flame and then collected with the university's 12" f/15 Brashear refracting telescope in the campus observatory built in 1896. Students learn to use IGOR to reduce CCD data.