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Advanced laboratory experiments incorporating a wide variety of NMR techniques have been developed for use in chemistry major courses at St. Catherine University. This project is part of a larger effort to reframe the chemistry lab curriculum around four fundamental concepts: structure, mass, energy, and change. These lab experiments were designed to increase student expertise in more complex NMR methods including the use of two-dimensional spectra, selective decoupling, heteronuclear coupling, the Evans method to determine paramagnetism, and variable temperature effects. The structural information gained includes complicated structure assignments, geometry deduced from magnetism, consequences of structure on thermodynamics, and how heteronuclear NMR reveals unique information. The four labs developed will be implemented in advanced analytical, physical, and inorganic chemistry courses. Assessment tools have been created to measure the student outcomes of these experiments which focus on gradual development of student understanding of how NMR reveals structural information.