Module 1 **Overview of Spectroscopy, Scattering, and Structure** *(9 lectures)* This section will survey various types of absorption and emission spectroscopy, both vibrational and electronic. Upon completion, the student should be familiar with most standard uses of spectroscopy, as well as some basic simulation techniques.

Module 2 **Magnetic Resonance** *(9 lectures)* This module will emphasize an empirical understanding of magnetic resonance spectroscopy, both nuclear spin resonance (NMR) and electron spin resonance (ESR or EPR). It will survey various cw techniques and pulse sequences used to study molecular structure and dynamics. This module will introduce the concept of two-dimensional spectroscopy.

Module 3 **Into the Future with Quantum Mechanics** *(10 lectures)* This module will focus on the quantum physics that underlies modern spectroscopy. In particular, students will begin by learning the mathematical framework used in magnetic resonance. This same framework, with some notational differences, will also be applied to two-dimensional laser spectroscopy.