

## Goals of Chem 311

1. Understand that a microscopic system is governed in quantum mechanics by the Schrödinger equation. Understand the physical and mathematic meanings of the solutions for simply systems such as particle-in-a-box, harmonic oscillator, and single electron atom.
2. Understand important quantum mechanical phenomena, such as the uncertainty principle, energy quantization and zero-point energy, and tunneling, etc.
3. Understand the meaning of the wavefunction as the probability amplitude and its role in representing the state of a microscopic system.
4. Understand approximate descriptions of atomic and molecular structures, particularly the variational principle.
5. Understand the quantum mechanical nature of a chemical bond via molecular orbital theory.
6. Understand molecular symmetry and it applications.
7. Understand spectroscopy, which resulted from the interaction between photons and molecules, for molecular rotation, vibration, and electronic excitations.