Course Outline:

- Statistical Basis of Thermodynamics

- Ensemble Theory
  - Postulates of statistical mechanics and microcanonical ensemble
  - Canonical ensemble, thermodynamic identifications and applications
  - Grand canonical ensemble

- Quantum Statistics
  - Ideal gases
  - Bose systems
  - Fermi systems

- Statistical Mechanics of Interacting Systems
  - Cluster expansions and virial coefficients
  - Phase transitions and critical phenomena
  - Criticality, universality and scaling
  - Order parameters and mean-field theory
  - Ising, Potts and other theoretical models

- Approach to Equilibrium
  - Phase space and Liouville's theorem
  - Boltzmann's transport equation
  - Boltzmann's H-theorem and the equilibrium distribution