

**University of Wisconsin-Madison**  
**Fall 2018**  
**Chemistry 661. Chemical and Statistical Thermodynamics**

**Instructor:** Professor A. Yethiraj, 8305B Chemistry, 608 262 0258, Office hours: By appointment

**Canvas Course URL** <https://canvas.wisc.edu/courses/105463>

**Instructional mode:** face-to-face

**Course Designations:** Advanced level, Physical Science breadth; counts as L&S credit

**Course Description:** Basic chemical thermodynamics with applications to chemical and phase equilibria and the study of solutions; introduction to statistical mechanics and calculation of thermodynamic quantities from molecular models; stability and fluctuations.

**Additional Description:** Fundamentals of thermodynamics and statistical mechanics; theory of ensembles, application to liquids, crystals, and electrolytes.

**Requisite:** CHEM 562 or graduate standing

**Credits:** 3

**How Credit Hours are Met:** This class meets for forty-two 50-minute lectures over the course of the semester. Students are expected to do at least 135 hours of learning activities, which includes class attendance, reading, studying, preparation, problem sets, and other learning activities.

**Meeting Time and Location:** MWF 11:00-11:50 AM in room 8335 Chemistry

**Grading:** One mid-term exam (120 points), 8 problem sets (10 points each), and one final exam (200 points). Course graded on a curve with an AB average.

**Learning outcomes:** Students are expected to be able to read the literature in statistical mechanics, develop models for common experimental systems, and perform mean-field calculations for these models. In addition, students will learn fundamental aspects of the following topics:

- Thermodynamics and equilibrium statistical mechanics
- Ideal gases and imperfect gases.
- Heat capacity of crystals.
- Structure of liquids
- Electrolyte solutions