

## **Syllabus for Chem 525/425 Fall 2021**

### **Chemical Thermodynamics**

**Tue, Thu 1:00 - 2:20 PM ARC-105**

#### **Textbook:**

Molecular Driving Forces by Dill & Bromberg (Garland Science, 2011, 2<sup>nd</sup> ed):*recommended*

**Instructor: Sagar Khare (SDK) ([khare@chem.rutgers.edu](mailto:khare@chem.rutgers.edu));**

#### **Week 1: Thu Sept 2**

- 1) Introduction to probability, statistics of particles (MDF 1,2)

#### **Week 2: Tue Sept 7, Thu Sept 9**

- 2) Entropy and energy as driving forces (MDF 2,3)
- 3) Optimizing thermodynamic functions (MDF 4)

#### **Week 3: Sept 14,16**

- 4) Maximum Entropy & the Boltzmann principle (MDF 5)
- 5) Energies, enthalpies, thermodynamic states (MDF 6)

#### **Week 4: Sept 21,23**

- 6) Free energies, chemical potentials (MDF 8)
- 7) Maxwell's relations and mixtures (MDF 9)

**Week 5: Sept 28, Sept 30**

8) Boltzmann's Law (MDF 10)

Problem Solving session

**Week 6: Oct 5,7**

9) Statistical thermodynamic approach to equilibrium constants, binding affinities (MDF 13)

10) Liquids, phase equilibria (MDF 14)

**Oct 12,14:**

11) Solutions and Mixtures (MDF 15)

**Week 8: Oct 19,21**

Review + Problem Solving Class

MID-TERM exam (Oct 21)

**Week 9: Oct 26, 28**

12) Solvation, free energies of transfer, mixtures, colligative properties (MDF 16)

**Week 10: Nov 2, 4**

13) Polymers: chemistry and synthesis, statistical thermodynamics (MDF 32)

**Week 12: Nov 9, 11**

13) Phase transitions (MDF 25)

**Week 13: Nov 16,18**

14) Polymers contd.: polymer solutions, Flory-Huggins (MDF 33)

**Week 14: Nov 23 (No class Nov 25)**

15) Adsorption & binding (MDF 27)

**Week 15: Nov 30, Dec 2**

16) Multi-site and co-operative ligand binding (MDF 28)

**Week 16: Dec 7,9**

Review

Final Exam (Take-home; due by Dec 16)