

COURSE SYLLABUS

Winter 2021

COURSE: CHEM 573 Nature of the Condensed Phase in Chemistry

Instructor: Dr. Venkataraman Thangadurai

Proposed Course Outline

1. Introduction

Thermodynamics and Statistical Thermodynamics

2. Statistical Thermodynamics- Concepts and Applications

- Boltzmann Statistics
- Bose-Einstein Statistics
- Fermi-Dirac Statistics
- Partition Function
- Estimation of thermodynamic properties (e.g., entropy, free energy), using statistical mechanics

3. Crystal chemistry, Diffraction Methods to Study Solid State Materials

- Classification of solids
- Crystal Systems
- Miller Indices
- Diffraction Methods
- Bragg's Equation
- Application of Bragg's equation

4. Interpretation of Solid State Phase Diagrams

- Gibbs phase rule revisited
- Two Component Solid State Phase Diagrams
- Three Component Solid State Phase Diagrams

5. Transport Properties of Solid State Materials

- Insulators
- Semiconductors
- Ionic Conductors / Solid Electrolytes
- Mobility, Diffusion and Partial Conductivity of Ions and Electrons
- Electrochemical method - Determination of Partial Conductivities
- Galvanic Cells with Solid Electrolytes for Thermodynamic Investigations

Department Approval:

Date: