

## Materials 100A Fall 2017 Final Exam

The final exam is not cumulative. Only the last third of the class will be covered, starting with polymers. However, you may likely need to use what you have learned throughout the entire course to answer questions on the final. In general, everything covered in class and on the problem sets (starting with polymers) is fair game for the exam. Below is a brief, non-inclusive outline to aid your studying:

### Chapter 14: Polymers

1. Basic hydrocarbon chemistry and how monomers come together to form polymers
2. Types of bonds between monomers
3. Working with molecular weights, degree of polymerization, crystallinity, *etc.* of polymers
4. Structure of polymers (*e.g.* linear vs. branched, vs. cross-linked, vs. networked and the different types of isomerism.
5. Polymer tacticity

### Chapter 19: Thermal Properties of Materials

1. Heat capacity and the difference between specific heat and heat capacity
2. Thermal expansion and its origins
3. Thermal conductivity
4. Thermal behavior of different types of materials (polymers, metals, semiconductors, *etc.*)

### Chapter 18: Electrical Properties of Materials

1. Concepts of resistivity, conductivity, charge carriers (electrons and holes)
2. Electronic structure of extended solids
  - a. Concepts of bands: valence band, conduction band, band gap, Fermi energy
  - b. Metals vs. semiconductors and the concept that semiconductors are **electron-precise**
  - c. electron mobility
3. Influence of temperature on resistivity
4. Doping semiconductors
5. Electronic properties of intrinsic and doped semiconductors

### Chapter 21: Optical Properties of Materials

1. Transmission, reflection, absorption, emission, and refraction
2. Why materials are colored (or not colored)