□ 강의진행계획

**Ⅰ Typology and Structure of Polymers**

**Chap. 1. Skeletal Structure of Polymer Chains**

* 1. Configurations and Conformations
     1. Examples of configurations and conformations
     2. Theory and instruments
  2. Stereochemistry and Tacticity
     1. Stereochemistry of repeating units
     2. Repeating unit isomerism
  3. Copolymers
     1. Common types of copolymers
     2. Quantitative determination of MER distribution
     3. Multicomponent polymers

**Chap. 2. Molecular Weights and Size**

* 1. Molecular Mass and Molecular Mass Distribution
     1. Polymer size and shape
     2. Molecular weight average
     3. Molecular weight of common polymers
  2. Determination of Molecular Weight Averages and Sizes
     1. Number-average molecular weight
     2. Weight- average MW and radii of gyration
     3. Intrinsic viscosity and gel permeation chromatography
     4. Solution thermodynamics and molecular weights

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**Ⅱ Thermodynamic Properties of Polymers**

**Chap. 3. The Solubility Parameter**

* 1. Cohesive Energy
     1. Definitions of Cohesive Energy
     2. Determination of Cohesive Energy
  2. The solubility parameter
  3. Refinements of the solubility parameter concept
     1. Hansen Parameter
     2. δv – δh Diagram
  4. Solubility of Polymers in Solvents
  5. Prediction of Solubility Parameter Components

**Chap. 4. Thermodynamics of Mixing**

* 1. Entropy of Binary Mixing
  2. Energy of Binary Mixing
  3. Equilibrium and Stability
  4. Phase Diagram
  5. Experimental Investigation

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**Ⅲ Assembled Nanostructure of Polymers**

**Chap. 5. The Amorphous State**

* 1. The Amorphous Polymer State
  2. Experimental Evidence Regarding Amorphous Polymers
     1. Short-range interactions in amorphous in polymers
     2. Long Range Interactions in Amorphous Polymers
  3. Conformation of the Polymer Chain
  4. Macromolecular Dynamics
     1. The Rouse-Bueche theory
     2. The de Gennes reptation theory
     3. Nonlinear Chains

**Chap. 6. The Crystalline State**

* 1. Crystallinity, Nucleation and Growth
     1. Crystallinity
     2. Nucleation and Growth
  2. Spherulitic Crystallization of Polymers from the Melt
     1. The Overall Rate of Crystallization
     2. Nucleation
     3. The Rate of Growth
  3. Induced Crystallization by Pressure and Stress
     1. Pressure-induced Crystallization
     2. Stress-induced Crystallization
  4. Extended Chain Crystallization of Flexible Polymer Chains
  5. Extended Chain Crystallization of Rigid Macromolecules

**Chap. 7. Polymers in the Liquid Crystalline State**

* 1. Definition of Liquid Crystal
  2. Liquid Crystalline mesophases
  3. Liquid Crystal Classification
  4. Thermodynamics and Phase Diagrams

**Chap. 8. Polymers in Hyperstructures**

* 1. Microstructure Based on Block Copolymers
     1. Definition of Copolymers
     2. Synthesis Methods for Block Copolymers
     3. Block Copolymer Aggregate and Self-assembly
  2. A Closer Look at Microstructure
     1. Block Copolymer Phase Behavior
     2. Amphiphilic Block Copolymers in Mixtures with Water and Oil
  3. Applications of Copolymers
     1. Commercialized Applications
     2. Potential Applications

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**Ⅳ Transport properties of polymers**

**Chap. 9. Glass-Rubber Transition Behavior**

* 1. Five Regions of Viscoelastic Behavior
  2. Methods of Measuring Transitions in Polymers
  3. Theories of the Glass Transition
  4. Factors Influencing on Tg

**Chap. 10. Polymer Viscoelasticity and Rheology**

* 1. Stress Relaxation and Creep
     1. Molecular bases of stress relaxation and creep
     2. Models for analyzing stress relaxation and creep
     3. The Takayanagi models
  2. Relaxation and Retardation Times
     1. The relaxation time
     2. Application of relaxation times to chemical rxn.
     3. The retardation time
  3. The Time-Temperature Superposition Principle
     1. The master curve
     2. The reduced frequency nomograph
  4. Polymer Melt Viscosity
     1. The WLF constants
     2. MW dependence of the melt viscosity
  5. Polymer Rheology

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**Ⅴ Properties of Polymers in Force Fields**

**Chap. 11. Mechanical Behavior of Polymers**

* 1. Deformation and Fracture in Polymers
  2. Crack Growth
  3. Cyclic Deformations
  4. Molecular aspects of fracture and healing in polymers

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**Ⅵ Modern Polymer Topics**

**Chap. 12. Modern Polymer Topics**

* 1. Self-assembling polymers
  2. Electrical behavior of polymers
  3. Non-linear optical polymers