**Introduction**

1. Problem Formulation in the Transport Processes
   1. Mathematical models provide more quantitative insight into biological processes by seeing how parameters influence it
   2. Applications in plants, mammals, environment, and industrial processing of biomaterials and food
2. Transport in Mammalian Systems
   1. Cellular
      1. Across cell membrane
      2. Diffusion
      3. Hydraulic/osmotic
      4. Carrier-mediated
      5. Passive ion
      6. Active
   2. Tissue and Organ
      1. Diffusion of oxygen (lungs)
   3. Whole-body
      1. Thermoregulation
      2. Thermal therapy
3. Transport in Plant Systems
   1. Leaves
      1. Solar energy
      2. Carbon dioxide diffusion
      3. Evaporation of water
   2. Roots
      1. Water from soil
      2. Minerals
   3. Cell membrane diffusion
      1. Water
      2. Solute
      3. Bulk flow
4. Transport in Industrial Food and Biological Processing
   1. Heat and moisture transport influence chemical and microbiological changes
   2. Sterilization of food with heat
   3. Freezing of food has change of phase
   4. Drying
   5. Diffusion of gas
   6. Heat generation from respiration
   7. Fermentation
      1. Oxygen transport
   8. Waste treatment facility
5. Transport in the Bioenvironmental System
   1. Water
      1. Pollution
   2. Air
      1. Airborne particles
      2. Evaporated water
   3. Soil
      1. Bulk flow
      2. Dispersion of water and chemicals
   4. Indoor
      1. Solar energy
   5. Outdoor
      1. Heating loss through walls
      2. Transport of odors
      3. Indoor pollutants