I. Ecosystems
   A. Ecosystems consist of all the organisms that live in an area along with the nonbiological components
   B. Energy and nutrient flows link the biotic and abiotic environments.

II. Energy Flow and Trophic Structure
   A. All ecosystems consist of four components, linked by the flow of energy:
      1. Primary producers
      2. Consumers
      3. Decomposers
      4. Abiotic environment
   B. Key Points about Energy Flow through Ecosystems
      1. ENERGY ENTERS ecosystems in the form of SUNLIGHT that is used in photosynthesis by producers.
      2. Plants use only a tiny fraction of the total radiation that is available to them.
      3. Only a tiny fraction of fixed energy actually becomes available to consumers.
      4. Most net primary production that is consumed enters the decomposer food web.
      5. From there, only a small fraction is used for secondary production by herbivores and carnivores.
      6. MOST ENERGY fixed during photosynthesis is USED FOR RESPIRATION, not synthesis of new tissues.
   C. Trophic Structure
      1. Organisms that obtain their energy from the same type of source occupy the same trophic level.
      2. Each feeding level within an ecosystem represents a TROPHIC LEVEL.
      3. Organisms at the top trophic level are not eaten by any other organisms.
      4. PRODUCTIVITY is HIGHEST at the LOWEST trophic level.
   D. Food Chains and Food Webs
      1. Food chains are typically embedded in more complex food webs.
      2. The maximum number of links in any food chain or web ranges from 1 to 6.
         a. Hypotheses offered to explain this:
            (1) Energy transfer may limit food-chain length.
            (2) Long food chains may be more fragile.
            (3) Food-chain length may depend on environmental complexity.
         b. There is no simple explanation for this.