I. Lipids
   A. Classified based on solubility
      1. insoluble in polar solvents
      2. soluble in nonpolar solvents
      3. hydro________

   B. Two main components of fats
      1. fatty acids
         a. -COOH functional group
         b. even number of carbons
         c. saturated
         d. unsaturated
      2. glycerol
         a. 3-carbon alcohol
         b. 3 OH functional groups

   C. Triglycerides (triacylglycerol)  (Fats and Oils)
      1. COOH groups of fatty acids react with OH of glycerol
      2. fats –
      3. oils –
      4. the greater the unsaturation, the lower the melting point

   D. Phospholipids
      1. replace a fatty acid with PO$_4$
      2. amphiphilic
      3. shorthand representation:

   E. Steroids (insoluble in water)
      1. have 4 carbon rings
      2. functional groups and locations of double bonds differ
3. cholesterol

II. Protein Structure
   A. Amino acid subunits
      1. 20 commonly found in nature
         - some essential
      2. 3 components
         a.
         b.
         c.

   B. Linked together by peptide bonds
      1. NH\textsubscript{2} of one amino acid is covalently linked to COOH of another
      2. end groups (NH\textsubscript{2} and COOH) still available
      3. H\textsubscript{2}O is released
      4. dipeptides, polypeptides, proteins

   C. Size

   D. Primary structure
      1. order of amino acids
      2. determined by DNA (genes)

   E. Secondary structure
      1. H bond interactions and polarity
      2. alpha-helix of beta-pleated sheet

   F. Tertiary structure
      1. R-group interactions (polar vs. nonpolar)
      2. 3-D folding of helix or pleated sheet

   G. Quaternary structure
      1. 2 or more folded polypeptide chains bonded together
      2. hemoglobin, insulin

III. Importance of Protein Structure
A. Many biological functions
   1. structural molecules
   2. enzymes

B. Amino acid combinations

IV. Reactions
   A. Proteins may undergo reactions
      1. hydrolysis
      2. denaturation