Homework: 3, 5, 6, 9, 10, 12, 15. 14.1 Glycolysis. Briefly put, you should know everything about Glycolysis. That means structures of all reactants and products, names of enzymes, cofactors for each reaction, and approximate $\Delta G^{\circ}$ for reactions with standard free energy changes with absolute value greater than 16 kJ/mol. You should know the pathway itself (summarized in Fig 14-2) and the fates of pyruvate (Fig 14-3). You should know the mechanism of class I Aldolase (Fig 14-5 is more complex than it needs to be, mainly know Schiff Base forms between Lysine NH$_2$ and keto C=O). Also know the mechanism of G3PDH (Fig 14-7 is complex, mainly know that Cys $-$SH forms thioester with G3P).

14.2 Feeder Pathways for Glycolysis. Understand how glycogen can be broken down using glycogen phosphorylase, debranching enzyme, and phosphoglucomutase, yielding Glu-6-P. Glucose also comes from dietary starch, and amylose is hydrolyzed by amylase to yield free glucose. Disaccharides are hydrolyzed into monosaccharides. Know about Lactose Intolerance. Of the non-glucose monosaccharides, we will focus on galactose. Know how galactose is converted into glucose (Fig 14-11). A simple 4-epimerase would do the trick but typically hexoses require attachment of a UDP "handle" for such reactions. Lack of one of these enzymes produces Galactosemia, which can be very serious. The worst form is caused by lack of UMP-Transferase.

14.3 Fates of Pyruvate under Anaerobic Conditions: Fermentation. The simple anaerobic fate of pyruvate is conversion to lactate – note the $\Delta G^{\circ}$ of this reaction. Yeast cells are eukaryotic and yeast anaerobic metabolism is different, resulting in ethanol. Understand the role of Thiamine in this and other reactions. Know the structure of the five membered ring of TPP. Carefully read Box 14-1 (alligators) and Box 14-2 (beer).

14.4 Gluconeogenesis. Gluconeogenesis is the pathway that synthesizes glucose. It makes use of all the reversible reactions of Glycolysis, run backwards. Fig 14-16 summarizes both pathways. The three irreversible reactions of Glycolysis are all Kinase reactions: Hexokinase, Phosphofructokinase, and Pyruvate Kinase (note that PG Kinase is reversible). Hexokinase and PFK-1 are reversed by simple "bypass" reactions, G6Pase and Fructose Bisphosphatase (p. 547). Know why G6Pase is "dangerous" and has to be compartmentalized. Pyruvate Kinase requires a more complicate "bypass" (Fig 14-17). Know the five membered rings of Biotin (Fig 14-18). Making glucose from 2 lactate requires 6$-$P, whereas Glycolysis from glucose to lactate affords a net gain of only 2$-$P. The Cori Cycle (Box 14-1) links liver Gluconeogenesis to muscle Glycolysis. Mutual regulation of the 2 pathways is discussed in more detail in the Glycogen chapter (15).

14.5 Pentose Phosphate Pathway of Glucose Oxidation. Know all details about the oxidative branch (Fig 14-21) and the non-oxidative branch (p. 552-3) of the PPP. Use the "Pentose Phosphate Worksheet" handout online. The goals of the PPP are production of NADPH and/or Ribose-5-P. Know about the effects of G6PDH Deficiency (Box 14-3). Understand Wernicke-Korsakoff Syndrome (554).