Outline for “Enzymes” Lecture

Chemical reactions
- Exergonic vs. endergonic reactions
- Reversible reactions
- Law of Mass Action

What is an enzyme?

Enzyme characteristics
- Catalysts
- Composition
- Specificity
- Saturable
- Classification
  - Types of enzymatic reactions

Enzyme structure
- Active Site
  - Binding and catalytic sites
    - Induced-Fit Model
  - Substrate specificity
- Allosteric Site

How does an enzyme speed up a chemical reaction?
- Energy of Activation lowered because
  - Easier for substrates to interact in the correct orientation
  - Increased substrate “reactivity”

Enzymatic function
- Proenzymes
- Cofactors
  - Coenzymes
  - Prosthetic groups
  - Metal ions

Factors that modulate enzyme activity (and thus reaction rate)
- Enzyme concentration
- Substrate concentration
- Modulators
  - Activators and inhibitors
    - Feedback inhibition
- pH
- Temperature

Phenylketonuria
**Objectives:** By the end of lecture today you should be able to . . .

1. What is an enzyme?
2. What are endergonic vs. exergonic reactions? Catabolic vs. anabolic?
3. What is the Law of Mass Action?
4. Why would a particular enzyme be able to bind to only one or a small number of substrates?
5. Describe the general structure of an enzyme.
6. What does it mean when someone says that enzymes are “saturable?”
7. Describe the four general types of reactions that enzymes can catalyze.
8. Explain the mechanism by which enzymes alter the speed of chemical reactions.
9. What is a cofactor? What is a main difference between coenzymes and prosthetic groups?
10. Describe how enzyme and substrate concentrations, temperature, pH, and modulators can alter enzyme activity and thus reaction rate.
11. What is the difference in how competitive vs. non-competitive inhibitors work?
12. What is the purpose of feedback inhibition in biochemical pathways?
13. How does an allosteric activator work?