SI Session 11
10/08/25

- What is the steady state assumption?
  [ES]/time = constant
  The amount of enzyme present (in the ES complex) remains the same throughout the reaction.
  Formation [ES] = Breakdown [ES]

- What is Et?
  The total amount of enzyme. This includes free enzyme and enzyme bound by substrate.
  Et = E + ES

- Define velocity in an enzymatic sense
  V = [product] / Δtime
  -Amount of product produced over a certain amount of time
  -Rate of product formation

- Define initial velocity
  No active sites (on enzymes!) are occupied by substrates. This is at t = 0. If there are no active sites bound by substrates, we have no product (yet).

- Draw the simplest reversible enzymatic reaction

- From the reaction above, how would we derive the equation for velocity?

- Derive the equation for Vmax from the above reaction. What does Vmax represent?
  Vmax: all active sites are bound by substrates. This is the point of the fastest rate of product formation.

- Draw the graph representing the amount of product formed/ time. After a long period of time, what is happening?
  1. When we let a rxn go to completion, product concentration is high, which allows causes it to bind to the free enzyme.
  2. Concentration of substrate is decreasing and cannot bind to the enzyme. The binding of product inhibits the binding the substrate. This will decrease product formation.
  3. Over time, the enzyme denatures.

- What is the Michaelis constant (Km)? What does it represent?
  Km=1/2Vmax concentration
  (Half of the active sites are bound by substrate)
  It tells us the affinity for a substrate binding to an enzyme
  Smaller km=higher affinity

- Derive the Michaelis-Menten equation