



# Research In Progress Seminar

**Tuesday, November  
15, 2016  
2:00PM**

**Location: The Fishbowl,  
2120 Biological Sciences 3**

## **Speaker:**

Lara Clemens,  
MCSB PhD Program

## **Talk Title:**

Emergent Properties of  
Multiply Phosphorylated  
Intrinsically Disordered  
Proteins

## **Abstract:**

Many proteins involved in cell signaling have intrinsically disordered regions, including some with no cytoplasmic structure at all. Despite this, unstructured signaling molecules have been found to exhibit complex nonlinear behavior, including cooperativity and sequential binding. For example, the intrinsically disordered T Cell Receptor zeta chain has six tyrosines and exhibits an approximately 100-fold enhancement from first to sixth phosphorylations. Here, we model the zeta chain as a freely-jointed chain model coupled to idealized spherical binding enzymes. Following experimental and theoretical evidence, we explore an assumption that phosphorylation stiffens nearby peptide bonds. We find that entropic flexibility alone leads to cooperativity in kinase activity, and, additionally, that sequential binding emerges naturally from entropic effects. The disordered regions themselves may therefore act as modules in signal transduction cascades.

## **Questions:**

Please contact Naomi  
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