**Eric Shea-Brown – CNeuro Lectures 2021**

There is an avalanche of new data on the brain’s activity, revealing the collective dynamics of vast numbers of neurons.  In principle, these collective dynamics can be of almost arbitrarily high dimension, with many independent degrees of freedom — and this may reflect powerful capacities for general computing or information. In practice, neural datasets reveal a range of outcomes, including collective dynamics of much lower dimension — and this may reflect other desiderata for neural codes.  For what networks does each case occur?

**Lecture 1 (Basic):**

In lecture 1, we will introduce the underlying concepts from scratch, covering the contributions of many across the field and the years. We will then cover bottom-up mechanistic ideas that link tractable statistical properties of network connectivity with the dimension of the activity that they produce.  
  
**Lecture 2 (Advanced):**

In lecture 2, we will cover “top-down” ideas that describe how features of connectivity and dynamics that impact dimension arise as networks learn to perform fundamental computational tasks.

**Lecture Abstracts**

*Dimensionality in Neural Networks*