Mathematical Foundations of Neuroscience - Sample Questions - Lecture 14 - Synchronization of neurons and synaptic plasticity

Filip Piękniewski

January 17, 2010

Questions marked with * are not obligatory.

1. Explain what is the Kuramoto synchronization index.

2. Derive the phase model for SNIC oscillator (*).

3. What is Hebbian learning?

4. Explain the Oja rule. What problems of Hebbian learning does it solve?

5. Explain the Bienenstock-Cooper-Munro (BCM) synapse

6. Describe the principles of Spike timing dependent plasticity (STDP)

7. Sketch the concept of polychronous groups