

Computational Neuroscience: Neural Dynamics

Exercise 4, hand in by October 31, 2024

This is light-weight, mostly conceptual exercise on “neurophysics”, meant to motivate reading. Please read the first chapter of the book cited in my lecture (Neural dynamics: from single neurons to networks and models of cognition, Gerstner W., Kistler, WM, Naud, R, Paninski, L, Cambridge University Press, 2014). This chapter is made available on the web page for registered participants only. (Don’t share this pdf, which is for your personal use only!).

This chapter reviews the core concepts of the “neurophysics” part of my lecture in very readable form. It becomes more mathematical and modeling oriented from about page 15 on, so you may stop reading it in detail after about half, but do look over the rest to get an idea. There are some nuggets there you may want to take in.

1. Around Figure 1.2., write down a short narrative that explains the core concepts that describe the functional components of a neuron.
2. What is the functional significance of spike formation? (We discussed this in the lecture hour...) Short answer.
3. Around Figure 1.5, explain in a short narrative, how the concept of a neuron ”integrating” or ”summing” inputs and then ”firing” depends on the timing of the incoming spikes.