

# Title: Mathematical Neuroscience

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## Abstract:

In these lectures I will introduce the area mathematical neuroscience. I will first give a quick overview of the components of the nervous system, neurons, and describe their basic biophysics. I will then introduce the models of individual neurons as a dynamical system whereby we can describe aspects such as repetitive firing and bursting in terms of bifurcations. Next I will look at neurons as oscillators and introduce the theory of weak coupling and phase locking. I will then turn to large scale networks where the idea of firing rate models (such as the Wilson-Cowan model) will be introduced. I will conclude the analysis of the spatial behaviors of such networks