FALL 2020

APM 531 (MAT 494)

Mathematical Neuroscience

Instructor: S. M. Baer

Time: 3:00-4:15 Tuesday & Thursday

Location: DH 103

Schedule Line #: 87217 (APM 531); 87547 (MAT 494)

Credits: 3

Content: This is an introductory course to equip students with important mathematical tools for studying the neural circuits underlying brain function; to systematically build biophysical concepts for exploring the relation between structure and function in nerve cells and their networks. This is not a seminar course; but rather a self contained course structured with homework assignments. Topics: cable theory and neuronal branching; dendritic spine modeling with applications; Hodgkin Huxley and Hodgkin Huxley-like excitable systems such as Morris-Lecar and FitzHugh-Nagumo models; bursting oscillations in nerve, muscle and secretory cells; bifurcation analysis of excitable systems; synaptic modeling and activity-dependent processes; introduction to modeling neural subcircuits in the outer-plexiform layer of the retina; introduction to neuromorphic computing.

Prerequisites: Elementary Differential Equations: MAT 275.
(A course in partial differential equations is NOT required.)

This self contained course is open to graduate (531) and undergraduate (494) students of mathematics, life science, physics, psychology, and engineering. Please email Steven Baer (steven.baer@asu.edu) for further information.