

**FALL 2018**

## **Applied Math: APM 531**

# **Mathematical Neuroscience**

**Instructor:** S. M. Baer  
**Time:** 12:00-1:15 Tuesday & Thursday  
**Location:** STAUFA 301  
**Schedule Line #:** 92795  
**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.

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

**This is a self contained course open to graduate students of mathematics, life sciences, physics, psychology, and engineering; junior/senior level undergraduate students and Barrett Honor students.** Please call Steven Baer (965-1057) or email ([steven.baer@asu.edu](mailto:steven.baer@asu.edu)) for further information.