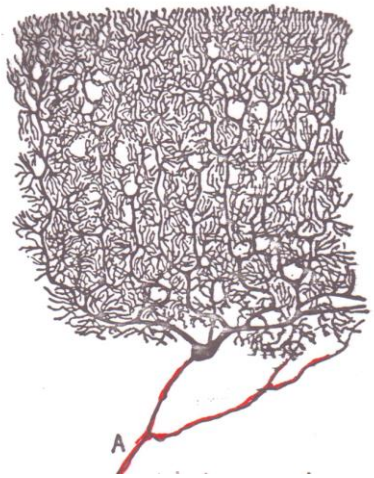
FALL 2020

APM 531 (MAT 494)

Mathematical Neuroscience



Purkinje cell in the cat cerebellum (drawn by Ramon y Cajal)

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.