

## Version 2.03 – New Features

### Lesson 2: Membrane Time Constant

- There are now two options for the stimulus: a square wave pulse and a synaptic potential-shaped pulse with an exponential rise and fall.
- Stimulus Train parameters are now in a separate window.

### Lesson 3: Membrane Length Constant

- An option has been added to turn on or off the normalization option. With “Normalize” selected, the stimulus is scaled to  $R_m$ ,  $R_i$ , and  $d$ , such that the steady-state depolarization at  $X = 0$  produced by a stimulus does not change when these parameters are varied.

### The 3D Display

- The z-axis of the display showing response amplitude is now normalized so that traces are shown full-scale.

### Registration

- Students and instructors must now register, giving their institution and course name, before downloading the MetaNeuron program. To receive email updates about new versions of MetaNeuron and other MetaNeuron news, your name and email should also be registered (this information is optional).

### Additional changes made since version 1 of MetaNeuron

- A new lesson, “Membrane Length Constant”, has been added. The lesson illustrates how the membrane length constant varies with membrane and cytoplasmic resistance and dendrite diameter. This lesson includes a full solution to the cable equations, showing, for example, how an EPSP is attenuated and slowed as it passively spreads down a dendrite. Voltage vs distance vs time solutions are shown in rotatable 3D plots.
- The lessons have been re-numbered. “Membrane Length Constant” is lesson 3.
- The “Synaptic Potential and Current” lesson has been revised. The lesson now illustrates how a synaptic potential is generated under current clamp, with the membrane potential and ionic currents displayed in side-by-side graphs.
- A new “Range” function has been added to all lessons. When the function is selected, a range of parameter values is automatically generated to create families of curves.
- A 3D display has been added. Families of curves can be viewed in rotatable 3D graphs.
- Cursor lines now appear automatically when the mouse is moved over the graph and clicked.