

Module 1: System Basics

Biophysics – Peter Latham

Overview

- Two equations:
 $V=IR$
 $Q=CV$
- Math: differential equations
- Single Neuron
- Synapse
- Dendrites
- Axons

Key words

Hodgkin-Huxley
Markov model
Activation curve
Inactivation curves
Time constant
Passive conductance
Active conductance
Action potential
Synapse
Neurotransmitter release
Voltage gated calcium channels
Neurotransmitter release
Ionotropic receptor
Metabotropic receptor
Release probability
Neurotransmitter concentration
Synaptic cleft
Glutamate
GABA
AMPA receptor
NMDA receptor
GABA_A receptor
GABA_B receptor
Excitatory synapse
Inhibitory synapse

Receptor agonist
Reversal potential
Rise time
Decay time
Plasticity
Release failure
Active zone
Vesicle pools
Readily releasable pool
Short-term synaptic plasticity
Facilitation
Depression
Post-synaptic potential
Long-term potentiation (LTP)
Long-term depression (LTD)
Synaptic strength
Homeostatic plasticity
Backpropagating action potential
Ion pore selectivity
Magnesium block
 I_{NMDA}
 I_{AMPA}
 I_{GABA}
Coincidence detector
Conductance