

Title: Cellular electricity: Physics and Modelling [3-0-0-6]

Content :

Action potential of excitable cells: Quantitative description, Hodgkin-Huxley model, significance of parameters in Hodgkin-Huxley equations; Voltage-clamp experiments: design, and analysis of results; Factors determining the initiation, amplitudes, and kinetic properties of action potentials.

Passive membrane electrical properties: Cellular resistance, capacitance, time constant and space constant, methods of measurement; Importance in cellular excitation and signaling: Impulse propagation.

Electrophysiology of synaptic transmission: Prejunctional and postjunctional electrical events; time courses of transmitter-activated membrane currents and potentials in skeletal and smooth muscle; Electrical models of the skeletal and smooth muscle membranes

Texts / References:

- J.G. Nicholls, A.R. Martin & B. Wallace: From Neuron to Brain, 3rd Ed., Sinauer, Sunderland, 1992.
- R.D. Barr & R.L. Plonsey: Bioelectricity: A Quantitative Approach, Academic Press, N.Y., 1988.
- E.R. Kandel & J. Schwartz (Ed.): Principles of Neural Science, 3rd Ed., 1991.