Neuroscience 201A Reading

Module 1 – Membrane Potential, Action Potentials, Single Channel Recording

Books/Book Chapters:

Fain G (2014) *Molecular and Cellular Properties of Neurons*, 2nd edition, Harvard University Press. Chapters 3-5.
There will be extensive coverage in lecture and discussion of the content of Chapters 3 and 5, and limited coverage of the content of Chapter 4. Note that the Fain book has a serious flaw in its description of the consequences of inward and outward currents. Beware!

* Hille B (2001) *Ion Channels of Excitable Membranes*, 3e, Sinauer.
Chapter 1 (Introduction) and 2 (Classical Biophysics of the Squid Giant Axon) and 10 (Elementary Properties of Ions in Solution). Chapter 1 is ~20 pages in length and a goldmine of condensed material that I hope you already know, including the Nernst equation/potential and Ohm's law as it applies to current, conductance, and driving force.

Johnston D, Wu S (1995) *Foundations of Cellular Neurophysiology*. MIT Press, Appendix A (pp. 481-514).
This goes into more detail than we will need, but it's excellent, and there are problems to work at the end of each chapter.

The Axon Guide, 3rd edition, Chapter 1, Bioelectricity.
The Axon Guide is available for download from the Molecular Devices web site at http://info.moleculardevices.com/acton/fs/blocks/showLandingPage/a/2560/p/p-023c/t/page/fm/0. If will probably end up reading this entire guide through a couple of times if you end up doing any serious electrophysiology. It's a great resource.

Microelectrode Techniques: The Plymouth Workshop Handbook, published by The Company of Biologists.
There are a couple of versions of this book, all evidently out of print. The 1984 edition is available for download from a UT Dallas site here: http://www.utdallas.edu/~tres/microelectrode/me.html. I cannot attest to the legality of this site.

Colquhoun D, Hawkes AG (1995) The principles of the stochastic interpretation of ion-channel mechanisms. In *Single Channel Recording*, Sakmann B, Neher E, eds., Plenum Press, New York, pp. 397-482.

Review Articles:

Noble D (1966) Applications of Hodgkin-Huxley equations to excitable tissues. Physiol. Rev. 46: 1-50.

Bean BP (2007) The action potential in mammalian central neurons. Nature Rev. Neurosci. 8: 451-465.

Jan LY, Jan YN (2012) Voltage-gated potassium channels in the diversity of electrical signaling. J Physiol 590: 2591-2599.

Original Papers:

Hodgkin AL, Huxley AF, Katz B (1952) Measurement of current-voltage relations in the membrane of the giant axon of Loligo. J Physiol 116: 424-448.

Hodgkin AL, Huxley AF (1952) Currents carried by sodium and potassium ions through the membrane of the giant axon of Loligo. J Physiol 116: 449-472.

Hodgkin AL, Huxley AF (1952) The components of membrane conductance in the giant axon of Loligo. J Physiol 116: 473-496.

Hodgkin AL, Huxley AF (1952) The dual effect of membrane potential on sodium conductance in the giant axon of Loligo. J Physiol 116: 497-506.

Hodgkin AL, Huxley AF (1952) A quantitative description of membrane current and its application to conduction and excitation in nerve. J Physiol: 117: 500-544

Aldrich RW, Corey DP, Stevens CF (1983) A reinterpretation of mammalian sodium channel gating based on single channel recording. Nature 306: 436-441.