REQUIRED TEXTBOOK:


COURSE DIRECTOR:

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SCHEDULE:

Part I: Basic Properties of Neurons

Tuesday 9/2
1. Bio-electricity and the passive properties of neurons (Byrne)

Thursday 9/4
2. Pumps, the distribution of ions, and the resting potential (Byrne)

Tuesday 9/9
3. Basic electrophysiological techniques (Byrne)

Thursday 9/11
4. Class Discussion (Byrne)

Tuesday 9/16
5. Active conductances and the action potential (Byrne)
Part II: Signaling in Neurons

Thursday 9/18

6. Hodgkin-Huxley analysis of voltage-sensitive conductances and quantitative description of the action potential (Byrne)

Tuesday 9/23

7. Problem solving session and class discussion (Byrne)

Thursday 9/25

8. TBA

Tuesday 9/30

9. Diversity of ion channels (voltage-gated ion channels) (Byrne)

Thursday 10/2

10. In Class Exam (EXAM 1)

Tuesday 10/7

11. Patch clamp and analysis of single ion channels (Heidelberger)

Thursday 10/9

12. Stochastic analysis of single channel function (Heidelberger)

Tuesday 10/14

13. Class Discussion (Heidelberger)

Thursday 10/16

14. Quantal analysis (Heidelberger)

Tuesday 10/21

15. Neurotransmitter release (Heidelberger)

Thursday 10/23

16. Class Discussion (Heidelberger).

Tuesday 10/28
17. Synaptic vesicle dynamics and presynaptic plasticity (*Heidelberger*)

*Thursday 10/30*

18. Post-synaptic mechanisms of synaptic transmission (*Heidelberger*)

*Tuesday 11/4*

19. Class Discussion (*Heidelberger*)

*Thursday 11/6*

19. **In class Exam** (EXAM 2, non-cumulative)

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**Part III: Plasticity**

*Tuesday 11/11*

20. Abstract Models of plasticity and what they can do (*Shouval*)

*Thursday 11/13*

21. Induction of bidirectional synaptic plasticity (*Shouval*)

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**November 15-19th, SFN meeting, no classes**

*Thursday 11/20*

22. NMDA receptors, calcium and a simple model (*Shouval*)

*Tuesday 11/25*

23. Class discussion (*Shouval*)

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**Thursday 11/27: Thanksgiving Holiday. No class.**

*Tuesday 12/2*

24. Expression of synaptic plasticity (*Shouval*)

*Thursday 12/4*

25. Class discussion on pre vs. postsynaptic expression (*Shouval*)

*Tuesday 12/9*

26. Homeostasis and synaptic scaling (*Shouval*)
Thursday 12/11

27. **In-Class Exam** (EXAM 3, non-cumulative)