GS140123 CELLULAR NEUROBIOLOGY: BIOPHYSICAL

REQUIRED TEXTBOOK:

"Foundations of Cellular Neurophysiology" by Daniel Johnston and Samuel Miao-sin Wu, MIT Press (ISBN 0-262-10053-3). This textbook can be ordered through the UT-H Bookstore. Also available at the Baylor College of Medicine Bookstore, Majors Books, or online at Amazon.com.

COURSE DIRECTOR:

Course Director:	Dr. Ruth Heidelberger
E-mail Address:	ruth.heidelberger@uth.tmc.edu
Office:	MSB 7.260
Phone:	(713) 500-5624

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**)**

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***)

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***)

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)