

**GS140103 CELLULAR NEUROBIOLOGY: MOLECULAR
AND DEVELOPMENTAL**

**Fall 2008
Tuesdays and Thursdays
10:30 AM – 12:00 Noon
MSB 7.037**

Course Director: Pramod Dash, Ph.D.

COURSE DESCRIPTION:

This course is a graduate level treatment of the molecular, cellular, and biochemical events that underlie cellular function. Emphasis is placed on the cell biology of neurons, development and maturation of the central nervous system, neurotransmitter synthesis and release, neurotransmitter receptors and second messenger systems related to neural function. The intent is to provide students with fundamental knowledge of the workings of nerve cells, including topics such as:

- Neuronal morphology and the establishment of polarity
- The structure and function of synaptic connections
- The cellular basis of development (including the unique aspects of the nervous system development)
- The second messenger cascades that regulate nerve cell function.

Lectures will be supplemented with student presentations. Students will be assigned dates and papers for class presentation by the teaching faculty.

SUGGESTED REFERENCE BOOK:

“Molecular Cell Biology” by Lodish, Berk, Matsudaira, Kaiser, Kreiger, Scott, Zipursky and Darnell.

COURSE DIRECTOR:

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GS140103 CELLULAR NEUROBIOLOGY: MOLECULAR AND DEVELOPMENTAL

DETERMINATION OF GRADES:

Examination 1	30%
Examination 2	30%
Examination 3	30%
Class Presentation	10%

SCHEDULE:

Part I: Cellular and Molecular Biology of Neurons

Tuesday, September 2

1. Overview (**Dash**),
Gene expression and protein synthesis (**Janz**)

Thursday, September 4

2. Structure and function of intracellular organelles (**Janz**)

Tuesday, September 9

3. Cytoskeletal structure and axonal transport (**Janz**)

Thursday, September 11

4. Cell biology of neurons, structural determinants, neuronal types (**Janz**)

Tuesday, September 16

5. Glial cells and transporters (**Janz**)/ **Student Presentation**

Thursday, September 18

6. Synaptic structure, types of synapses and their ultrastructures (**Janz**)/ **Student Presentation**

Tuesday, September 23

7. Molecular mechanisms of Vesicular trafficking (**Bean**)

Thursday, September 25

8. Genetics and protein trafficking (**Bean**)/**Student Presentation**

Tuesday, September 30

9. Exocytosis and endocytosis (**Bean**)/**Student Presentation**

Thursday, October 2

In Class Written Examination I 10:30AM – 12:00 Noon

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Part II: Receptors and Neuronal Signaling

Tuesday, October 7

10. Receptors and channels I (**Waxham**)

Thursday, October 9

11. Receptors and channels II (**Waxham**)

Tuesday, October 14

12. Receptors and channels III (**Waxham**)/**Student Presentation**

Thursday, October 16

13. G-protein and G protein-coupled receptors (**Waymire**)

Tuesday, October 21

14. Signaling via adenylyl cyclases and phospholipases (**Waymire**)

Thursday, October 23

15. . Signaling via calcium and diffusible gases (**Waymire**)

Tuesday, October 28

16. Serine/threonine protein kinases, their substrates and phosphatases
(**Waymire**)/**student presentation.**

Thursday, October 30

17. Tyrosine kinase signaling (**Waymire**)/**Student Presentation**

Tuesday, November 4

18. Integration of intracellular signaling (**Waymire**)/**Student Presentation**

Thursday, November 6

In Class Written Exam II 10:30 AM-12:00 Noon

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Part III: Development and Connections between Nerve Cells

Tuesday, November 11

19. Development of the Nervous System (**Dash**)

Thursday, November 13

20. Cell division, cell cycle and stem cells (**Dash**)

Tuesday, November 18

NO CLASS, Society For Neuroscience Meeting, Washington DC

Thursday, November 20

21. Neural Differentiation (**Dash/Student Presentation**)

Tuesday, November 25

22 Cell Migration (**Dash/Student Presentation**)

Thursday, November 27

NO CLASS, THANKSGIVING

Tuesday, December 2

23. Cell-cell and cell-matrix interaction (**Dash/Student Presentation**)

Thursday, December 4

24. Axon guidance (**Bean**)

Tuesday, December 9

25. Axon regeneration (**Bean/Student Presentation**)

Thursday, December 11

26. Target Recognition, Synapse Formation and Elimination (**Bean/Student Presentation**)

Tuesday, December 16

In Class Written Exam III 10:30 AM-12:00 Noon