Medicine 6196: Systems Neuroscience **Fall Semester 2008**

Course Coordinator: Dr. Penny Moody-Corbett

The aim of the Systems Neuroscience course is to ensure that students have a fundamental knowledge of Neuroscience concepts: membrane physiology, organization of the nervous system, sensory and motor systems and higher integrative function.

Timeline and Room:

Lectures

Tues and Thurs 2:00 – 4:00 (Sept. 4 to Dec. 18), schedule given below
Room 4347

Clinical Correlates

There are two clinical correlate sessions with the Undergraduate Medical 2nd year class: spinal cord Wed, Sept. 24, 9 – 9:50 and brain stem Tues. Sept. 30, 9 – 9:50 These are in Lecture Th. A

Laboratory

The labs (also scheduled with Undergraduate Medical 2nd year class) will be held in the Anatomy labs (2nd floor), schedule given below.

Topics and Timeframe:

Part 1

General organization and Basic Principles of NS (including csf, hierarchical and topographic representation), cellular and membrane physiology, synapses, synaptic plasticity, development, neurogenesis, signaling. **Time: 8 hr**

Part 2

Sensory Systems using somatosensory (4 hr) and vision (4 hr) as model systems but also including session on olfaction/taste (2 hr) and vestibular/audition (2hr). **Time: 12 hr**.

Part 3

Motor Systems Cortex, spinal cord, basal ganglia, cerebellum, voluntary movement, motor planning, postural control and locomotion. **Time: 6 hr**

Part 4

Neuroregulation and Higher Function

Feeding, drinking, stress **Time: 4 hr**
Memory and Learning **Time: 4 hr**
Emotion, Language, Sleep **Time: 6 hr**

Evaluation:

Term Paper Project (20%)

Students will be required to develop a 10 page (1.5 spacing, not including references or figures) paper throughout the term with the following timelines:

Submit Topic: Sept. 26 and feedback to students by Sept. 29
Submit Outline: Oct. 31 and feedback to students by Nov. 6
First Draft: Nov. 28 and feedback to students by Dec. 5
Final Draft: Dec. 12

Neuroanatomy Lab Exam (20%) Room: MELS 2821

Students will be required to attend and complete the second year neuroanatomy labs with the medical students. It is recommended that the students attend two of the clinical correlate lectures (Sept. 24 9-9:50 and Sept. 30 9-9:50). The graduate students will not be tested on the peripheral nerves.

Lab 1 Cortex and Blood Supply, Sept. 26: 10:40-12:30
Lab 2 Spinal Cord, Sept. 29: 11:00-1:00
Lab 3 Brain Stem, Oct. 1: 9-12
Lab 4 Vision and Cerebellum, Oct. 3: 9-11
Lab 5 Higher Cerebral Function, Oct. 7: 9-11:30
Lab review, Oct. 9: 11-12:30
Lab Exam, Oct. 27: 10:00-11:00

Quizzes (60%)

There will be a quiz after each section of the course, weighted based on hours per topic

Part 1: Sept. 18, 2:00 – 4:00
Part 2: Oct. 14, 2:00 – 5:00
Part 3: Oct. 28, 2:00 – 4:00
Part 4a: Nov. 18, 2:00 – 4:00
Part 4b: Dec. 2, 2:00 – 4:00

Proposed Readings: The following textbooks have been used in preparing lectures (specific chapters, for each section, are given in the table below):

Squire et al (2nd or 3rd edition), Fundamental Neuroscience,
Kandel et al (4th or 5th edition), Neural Sciences
Alberts et al (4th or 5th edition) Molecular Biology of the Cell

Lecturers:

DB: Duane Button
XC: Xihua Chen
DC: Dale Corbett
CH: Carolyn Harley
MH: Michiru Hirasawa
KL: Kris Langdon
CM: Crystal MacLellan
JM: John McLean
KM: Karen Mearow
PMC: Penny Moody-Corbett
JV: Jackie Vanderluit
JW: John Weber

DATE	Lecture Topic	Labs/Quizzes/Term Paper	Reading	Lecturer
Sept. 4 Sept. 9 Sept. 11 Sept. 16	Introduction and General Organization of the Course ***Part 1 Basic Principles and Organization*** Cellular and membrane physiology: RMP, AP, cable properties, synaptic physiology, synaptic plasticity, signaling Functional groups, hierarchical and topographic representation, csf, development, neurogenesis, stem cells		Alberts et al. (4th ed) Ch 11 Kandel et al (4th ed) Part II and Part III Alberts et al (5th ed) Ch 18, 22 Kandel et al (4th ed) Ch 17, 52, 53	PMC PMC PMC JV JV
Sept. 18		QUIZ 1 ***Part 1 Basic Principles and Organization***		
Sept. 23	***Part 2 Sensory Systems*** Somatosensory: touch, pain and temperature		Kandel et al (4th ed) Ch 22 and 24	XC
Sept. 24	Clinical Correlates Spinal Cord Lect. Th. A			
Sept. 25	Somatosensory: proprioception (muscle spindles and stretch receptors), stretch reflex,		Kandel et al (4th ed) Ch 21, 22 and 36	KM
Sept. 26		Topic for term Paper is due		PMC
Sept. 26 10:40-12:30		**LAB 1** Cortex and Blood Supply		
Sept. 29 11:00-1:00		**LAB 2** Spinal Cord		
Sept. 30 (9-9:50)	Clinical Correlates Brain Stem Lect. Th. A			
Sept. 30	Vision System and Vision Lecture I		Kandel et al (4th ed) Ch.25-28	CH
Oct. 1 9:00-12:00		**LAB 3** Brain Stem		
Oct. 2	Visual System and Vision Lecture II		Kandel et al (4th ed) Ch.25-28	CH
Oct. 3		**LAB 4** Vision and		

11:00-1:00		Cerebellum		
Oct. 7 9:00-11:30		**LAB 5** Higher Cerebral Function		
Oct. 7	Olfaction/taste		Kandel et al (4th ed) Ch. 32	JM
Oct. 9	Auditory and vestibular systems/audition and balance		Squire et al (3rd ed) Chapter 26, 30 Additional: Kandel et al (4th ed) Ch. 30, 31, 40	CM
Oct. 10 11:00-12:30		LAB Review		
Oct. 14		QUIZ 2 ***Part 2 Sensory Systems***		
Oct. 16 Oct. 21	***Part III Motor Systems*** Cortex, spinal cord, basal ganglia and cerebellum		Kandel et al (4th ed) Ch 33, 36, 42 and 43	JW JW
Oct. 23	Voluntary movement, motor planning, postural control and locomotion		Kandel et al (4th ed) Ch. 33, 36, 37, 38, 41	DB
Oct. 27 10:00-11:00		Lab Exam Room: MELS 2821		
Oct. 28		QUIZ 3 ***Part 3 Motor Systems***		
Oct. 31		Outline for term paper is due		
Oct. 30 Nov. 4	***Part 4 Neuroregulation and Higher Functions*** Hypothalamus and regulatory systems (neuroendocrine and autonomic nervous system)		Squire et al (2nd ed) Ch 34, 35, 38 – 40	MH MH
Nov. 6 Nov. 13	Memory Learning		Kandel et al. (4th ed.) Ch. 62 and 63	KL JM
Nov. 18		QUIZ 4 ***Part 4a Neuroregulation and Higher Functions***		
Nov. 20 Nov. 25 Nov. 27	Emotion Language Sleep/attention/circadian rhythms		 Squire et al (3rd ed) Ch.51 Squire et al (3rd ed) Ch. 41, 42, 48	CM DC DC

Nov. 28		1st draft of term paper is due		
Dec. 2		QUIZ 4 ***Part 4b Neuroregulation and Higher Functions***		
Dec. 12		Final term paper is due		

Sept. 4 Thurs. 2:00 – 4:00 PMC
Sept. 9 Tues. 2:00 – 4:00 PMC
Sept. 11 Thurs. 2:00 – 4:00 JV
Sept. 16 Tues 2:00 – 4:00 JV
Sept. 18 Thurs. 2:00 – 4:00 QUIZ 1
Sept. 23 Tues 2:00 – 4:00 XC
Sept. 24 Wed 9:00 – 9:50 Clinical Correlates: spinal cord
Sept. 25 Thurs. 2:00 – 4:00 KM
Sept. 26 Fri. submit topic for Term Paper to PMC
Sept. 26 Fri. 10:40 – 12:30 Lab. 1
Sept. 29 Mon. 11:00 – 1:00 Lab. 2
Sept. 30 Tues. 9:00 – 9:50 Clinical Correlates: brain stem
Sept. 30 Tues. 2:00 – 4:00 CH
Oct. 1 Wed. 9:00 – 12:00 Lab. 3
Oct. 2 Thurs. 2:00 – 4:00 CH
Oct. 3 Fri. 11:00 – 1:00 Lab. 4
Oct. 7 Tues. 9:00 – 11:30 Lab. 5
Oct. 7 Tues. 2:00 – 4:00 JM
Oct. 9 Tues. 11:00 – 12:30 Lab Review
Oct. 9 Thurs. 2:00 – 4:00 CM
Oct. 14 Tues. 2:00 – 5:00 QUIZ 2
Oct. 16 Thurs. 2:00 – 4:00 JW
Oct. 21 Tues. 2:00 – 4:00 JW
Oct. 23 Thurs. 2:00 – 4:00 DB
Oct. 27 Tues. 10:00 – 11:00 LAB QUIZ
Oct. 28 Tues. 2:00 – 4:00 QUIZ 3
Oct. 30 Thurs. 2:00 – 4:00 MH
Oct. 31 Fri. Submit Outline for Term Paper to PMC
Nov. 4 Tues. 2:00 – 4:00 MH
Nov. 6 Thurs. 2:00 – 4:00 KL
Nov. 13 Thurs. 2:00 – 4:00 JM
Nov. 18 Tues. 2:00 – 4:00 QUIZ 4a
Nov. 20 Thurs. 2:00 – 4:00 CM
Nov. 25 Tues. 2:00 – 4:00 DC
Nov. 27 Thurs. 2:00 -- 4:00 DC
Nov. 28 Fri. Submit 1st draft of Term Paper to PMC
Dec. 2 Tues. 2:00 – 4:00 QUIZ 4b
Dec. 12 Fri. Submit Final Term Paper to PMC