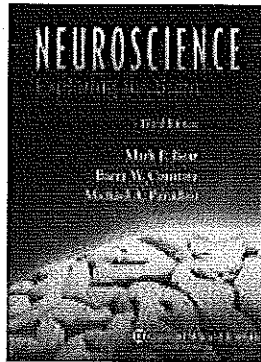


NROB60H3Y Neuroscience I: Cell Anatomy and Physiology (Summer 2008)

Coordinator: Joan P Forder, PhD



***Prerequisite: [BGYA01H & BGYA02H or (BGYA01Y)] & [PSYA01H & PSYA02H or (PSYA01Y)].

Note: [CHMA10H & CHMA11H or (CHMA01Y)] is strongly recommended for students with no Chemistry background).

*******PLEASE ENSURE YOU HAVE THESE...THEY WILL BE CHECKED*******

Overview of the structure and function of the nervous system.

Topics include neuroanatomy, structure and function of neurons and glia, neurochemistry, neural mechanisms of communication at the cellular and molecular levels, and intracellular signal transduction in neurons.

Lectures:

WebOptions only www.utoronto.ca/~nrob60/online.html

The videos links for the lectures will be activated and deactivated on the Tuesday of every week (except during the reading week). Lecture notes will also be posted weekly.

Labs:

All labs will be conducted in rooms S242 or S321.

Tutorials: WebOption Video Tutorials are provided during the weeks indicated in the schedule. No new material is presented in these tutorial videos.

Discussion Board:

As this is a WebOptions-based lecture format, participation and interaction on the course discussion board is strongly recommended. The discussion board will be closely monitored to ensure questions and comments are addressed in a timely manner. Interaction between students on the discussion board is strongly recommended.

Office Hours:

Dr. Forder: Tuesdays 10am -12 noon Room S512

Or by appointment (arranged by e-mail)

Teaching Team:**Course Coordinator:** Dr. Joan Forder**Teaching Assistants:**

- Sarah Johnston
- Kimia Honarmand
- Zenya Brown
- David Kupferschmidt

In-Reach Students:

- Meghna Bhattacharya
- Senthure Jeganathan

Lecture Textbook:

“Neuroscience: Exploring the Brain” 3rd revised edition by Bear, Connors and Paradiso. Website figures, animations, and instructions are included in new texts. ISBN: 978007817600. Obtained from the UTSC Bookstore

NOTE: Chapter 7 Appendix; diagrams from “An Illustrated Guide to Human Neuroanatomy” (pages 207 to 235) will be covered during lectures and during lab. Students may find the “self quizzes” (pages 236 to 248) helpful.

Lab Text:

On-line atlas; link available through the INTRANET

<http://reel.utsc.utoronto.ca/theatlas>

Grading Scheme for Course

Lectures: total 70% of final grade

Labs: total 30% of final grade

Lectures: total 70% of final grade

- 1 written assignment BEFORE midterm (5%) due June 10th. Hand in during lab session.
- Midterm (30%) (60 multiple choice & 5 short answer questions) (first 6 weeks of material)
- 1 written assignment AFTER midterm (5%) due July 29th. Hand in during lab session.
- Final Exam (30%) (60 multiple choice & 5 short answer questions) (NOT cumulative: last 6 weeks of material)

Labs: total 30% of final grade in this course

- Quizzes = 10% (5 * 2% = 10%)
- Written Assignment = 5%
- Bell ringer test = 15%

Lab Quizzes

A total of 6 quizzes will be given during your labs with only your best 5 counting. No make-up quizzes will be given and you may only write the quiz in your assigned lab period. If you are satisfied with your first 5 quiz results you are not required to complete all 6 quizzes. Each quiz will consist of 9 points. You will be required to give the name of the structure or the function of a structure/brain region as indicated. Testable material is cumulative and therefore can be drawn from any lab material covered in the course to date. During the first lab your TA will give a demonstration of the quiz format. Three dissection trays will

be set up with 3 pins in each tray. You will be given 1 minute to answer all questions at one tray. All quiz grades will be posted to the intranet. Each quiz will be valued at 2% of your final grade in the course.

Lab Written Assignment

You will be provided with an assignment outline during the first lab session. This is an individual assignment involving a case study. The due date is July 15th.

Lab Bell-ringer Component

The exact date and time of this component of your lab test will be determined by the registrar. Each student will complete 30 bellringer stations with one or two pins per station. The format of the test will be similar to the quizzes. Missed bell-ringer tests will only be conducted with the proper medical documentation and notification of the missed test to your TA. Please see the instructions outlined in the section above. Failure to meet these requirements will result in a grade of zero. Make-up tests may not follow the same format.

E-mail:

NROB60summer2008@yahoo.com

Short answer questions will be answered by e-mail. Questions involving detailed answers will be addressed in office hours. Response will be within 48 hours on weekdays.

Intranet Resources:

From home: <https://intranet.utsc.toronto.ca>

On campus: <http://intranet>

*Students need to sign up for a UTSC student account on this webpage.

PowerPoint Lecture Notes will be uploaded onto the intranet 24 hours prior to lecture whenever possible.

NOTE: ONLY an outline of the lecture will be posted; not the entire content. Material will be presented in class in addition to the lecture notes provided. Students should print out the lecture notes and bring it to class with them.

NOTE: Specific figures, tables, textbook pages and material presented in lectures will form the basis for examinations.

WebOptions Outline Summary*:

DATE	TOPIC	CHAPTER	FIGURES & TABLES
Week 1: May 05 – 11	<ol style="list-style-type: none"> 1. Introduction to the course 2. Neuroscience: Past, Present, and Future 3. Levels of Organization 4. The Scientific Process 5. The Use of Animals in Neuroscience 	1, 7	7-1, 2, 3, 1-1, 4, 5, 6, 8, 9, 12, 15 Illustrated Guide to Human Neuroanatomy (IGHN) pgs 207, 208, 215, 216 Table 1-1, 1-2, 1-3
	The Structure of the Nervous System: <ol style="list-style-type: none"> 1. Introduction 2. Gross Organization <ul style="list-style-type: none"> ➤ Anatomical references 3. CNS <ul style="list-style-type: none"> ➤ Cerebrum ➤ Cerebellum ➤ Brain stem ➤ Spinal Cord 	7	7-1, 4, 5, 21, 27 IGHN pgs 209, 210, 211
Week 2: May 12 - 18	The Structure of the Nervous System: <ul style="list-style-type: none"> ➤ PNS ➤ The Cranial Nerves ➤ The Meninges ➤ The Ventricular System 	7	7-6, 7, Box 7.1, IGHN pgs 212, 213 Table 7.1, 7.2
	Development of the Nervous System <ul style="list-style-type: none"> ➤ Neural Tube Formation ➤ Brain Vesicles ➤ Differentiation: <ul style="list-style-type: none"> ▪ Forebrain 	7	7.8 - 7.14 Box 7.4 Table 7.3 IGHN pgs 214, 232
Week 3: May 19 - 25	<ul style="list-style-type: none"> ➤ Differentiation: <ul style="list-style-type: none"> ▪ Midbrain ▪ Hindbrain ▪ Spinal Cord Putting it all together	7	7.15 – 20 IGHN pgs 218, 219
	The Prototypical Neuron <ul style="list-style-type: none"> ➤ Classification ➤ Soma ➤ Membrane ➤ Axon ➤ Dendrites 	2	IGHN pgs 220, 221 2-4, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 19, 20, Box 2.1, 2.2, 2.4,
Week 4: May 26 – June 01	The Prototypical Neuron <ul style="list-style-type: none"> ➤ Cytoskeleton 	2	2.13, 2.16 IGHN pgs 222, 223 Box 2.3

	<p>Glia</p> <ul style="list-style-type: none"> ➤ Astrocytes ➤ Myelination ➤ Others <p>Communication in the Brain</p> <ul style="list-style-type: none"> ➤ Overview ➤ Types of synapses ➤ Generation of electricity 	<p>2</p> <p>5</p>	<p>2-21, 22, 23</p> <p>IGHN pgs 224, 225</p> <p>5-1, 2, 3</p> <p>Box 5.1, 5.2</p>
<p>Week 5: June 02 - 08</p>	<p>The Resting Neuronal Membrane:</p> <p>1. Setting the Stage</p> <ul style="list-style-type: none"> ➤ The Chemicals ➤ Fluid Composition ➤ Phospholipid Membrane ➤ Proteins ➤ Movement of Ions 	3	<p>3-2, 3, 4, 6, 7, 8, 9,</p> <p>IGHN pgs 226</p>
	<p>The Resting Neuronal Membrane:</p> <p>2. Ionic Basis of the Resting Membrane Potential</p> <ul style="list-style-type: none"> ➤ Nernst Equation ➤ Distribution of ions <p>3. Relative ion permeabilities</p>	3	<p>3-10, 11, 12, 13, 14 Box 3.2</p> <p>3-15, 16, Box 3.3</p> <p>3-17, 20</p>
<p>Week 6: June 09 - 15</p>	<p>TUTORIAL (preparation for midterm examination)</p> <p>WRITTEN ASSIGNMENT #1 DUE JUNE 10TH</p>		
	<p>MIDTERM EXAMINATION</p>		<p>room TBA</p>
<p>Week 7: June 16 - 22</p>	<p>The Action Potential:</p> <ul style="list-style-type: none"> ➤ Introduction ➤ Properties ➤ Generation ➤ Theory 	4	<p>4-1, 2, 3, 4, 5</p> <p>Box 4.1</p>
	<p>The Action Potential:</p> <ul style="list-style-type: none"> ➤ Voltage Gated Sodium Channels ➤ Voltage Gated Potassium Channels ➤ Putting the Pieces Together ➤ Conduction 	4	<p>4-6, 7, 8, 9, 10, 11, 12,13</p> <p>Box 4.2, 4.3, 4.4, 4.6</p>
<p>Week 8: June 23 - 29</p>	<p>Principles of Synaptic Integration:</p> <ul style="list-style-type: none"> ➤ EPSP integration ➤ Dendritic Properties ➤ Inhibition ➤ Modulation 	5	<p>5-17, 18, 19, 20, 21, Box 5.5, 5.6</p>

	Principles of Chemical Synaptic Transmission: <ul style="list-style-type: none"> ➤ neurotransmitters ➤ receptors and effectors ➤ neuropharmacology 	5	Table 5-1 Figures 5-9, 10, 11, 12, 13, 14, 15, 16, Box 5.3,
June 30 – July 06	READING WEEK: no video		
Week 9: July 07 - 13	Neurotransmitter Systems: <ul style="list-style-type: none"> ➤ Introduction ➤ Studying the system: a scientist's perspective 	6	6-1, 2, 3, 4, 6, 7, 8. Table 6.1
	Neurotransmitter Chemistry: <ul style="list-style-type: none"> ➤ Cholinergic Neurons ➤ Catecholaminergic Neurons ➤ Serotonergic neurons ➤ Amino Acidergic Neurons ➤ Others 	6	6-10, 13, 14, 15, 16, 17, Box 6.1, 6.2
Week 10: July 14 - 20	Neurotransmitter Chemistry: <ul style="list-style-type: none"> ➤ Transmitter-Gated channels ➤ G-Protein-Coupled receptors and effectors ➤ Divergence and Convergence 	6	6-18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, Box 6.4
	1. Imaging the Brain 2. Special Features of the Human CNS 3. The Cerebral Cortex	7	Box 7.2, 7.3 7.21 - 7.28
Week 11: July 21 - 27	Wiring the Brain: Neurons <ul style="list-style-type: none"> ➤ Cell Proliferation ➤ Cell Migration ➤ Cell Differentiation ➤ Differentiation of Cortical Areas 	23	23.1 – 23.6 Box 23.1
	Wiring the Brain: Connections <ul style="list-style-type: none"> ➤ The Growing Axon ➤ Axon Guidance ➤ Elimination ➤ Synaptic Rearrangement 	23	23.7 – 23.23 Box 23.3, 23.5, 23.6
Week 12: July 28 – Aug 01	Synaptic Plasticity	23	23.24 – 23.28
	TUTORIAL (preparation for final examination) WRITTEN ASSIGNMENT #2 DUE JULY 29TH		

NROB60 Labs

This lab schedule will be discussed in the first week of labs. Any changes in your assigned lab section may only be made through ROSI, not by the Dr. Forder or TAs. All students will utilize the on-line sheep atlas posted to the Intranet. You are not required to purchase an atlas but due to popular demand by students from past years colour copies will be available for purchase at cost. **Details and a demonstration regarding the use of this atlas will be presented in your lab on May 13th.**

Lab Outline Summary*:

DATE	TOPIC	PHOTO SERIES	LAB QUIZ	LAB HANDOUT	TEXT
Week 1: Tuesday May 06	No Labs		No quiz		
Week 2: Tuesday May 13	Introductory Lab Lab Lecture #1: <ul style="list-style-type: none"> ➤ Lab rules ➤ Basic Terminology ➤ Accessing the on-line atlas ➤ Gross Anatomy Demonstration: <ul style="list-style-type: none"> ➤ Demonstration of quiz format 	1	No quiz	1	
Week 3: Tuesday May 20	Lab Lecture #2: <ul style="list-style-type: none"> ➤ Meninges ➤ Cerebral Cortex ➤ Functional Areas ➤ Cytoarchitecture Practical: <ul style="list-style-type: none"> ➤ Removal of Meninges ➤ 2. Major sulci and gyri 	2	#1	2	206-210
Week 4: Tuesday May 27	Lab Lecture #3: <ul style="list-style-type: none"> ➤ Blood Brain Barrier ➤ the Cerebral Vascular System Practical: <ul style="list-style-type: none"> ➤ Ventral surface structures ➤ Cranial nerves and functions 	3	#2	3	214-215 232-233
Week 5: Tuesday June 03	Lab Lecture #4: <ul style="list-style-type: none"> ➤ Cranial Nerves ➤ Ventricular System 	4	#3	4	211-213

	Practical: <ul style="list-style-type: none"> ➤ Mid-sagittal sectioning ➤ Identification of mid-sagittal structures 				
Week 6: Tuesday June 10	Lab Lecture #5: <ul style="list-style-type: none"> ➤ The Hippocampus Practical: <ul style="list-style-type: none"> ➤ Dorsal and lateral dissections ➤ Identification of Horizontal structures 	5	#4	5	
Week 7: Tuesday June 17	Lab Lecture #6: <ul style="list-style-type: none"> ➤ The Cerebellum Practical: <ul style="list-style-type: none"> ➤ Cerebellar coronal sections ➤ Discussion of Written Assignment 	6	#5	6	218-226
Week 8: Tuesday June 24	Lab Lecture #7: <ul style="list-style-type: none"> ➤ Tissue Preparation Practical: <ul style="list-style-type: none"> ➤ Rostral coronal sections ➤ Caudal coronal sections 	7	No quiz	7	218-226
July 01	READING WEEK: NO CLASS				
Week 9: Tuesday July 08	1. No new Lab Content 2. Lab review	all	#6		
Week 10: Tuesday July 15	Written Assignment Due	all			
Week 11: Tuesday July 22	Lab Test Requested Actual date and time to be confirmed by registrar	all			
Week 12: Tuesday July 29	Pick-up Lab Test				

- **Disclaimer: The above schedules, procedures and policies are subject to change in the event of extenuating circumstances.**