

## Introduction to Neuroscience CTY Course Syllabus

Day	Morning session	Afternoon session	Study hall
<b>Week 1</b>			
<b>Monday</b>	<p><b><u>Introductions</u></b> Lab safety video, introductions, review syllabus, textbooks, expectations, getting to know you</p>	<p><b><u>Introduction to Neuroscience (cont'd)</u></b> Neuroscience Foundations, brief history, levels of analysis, Neuroscientists</p>	<p>Review from day 1</p> <p><b><u>Articles:</u></b></p> <ol style="list-style-type: none"> <li>1. History of Brain Research article from FOSS</li> <li>2. A Lot of Nerve</li> <li>3. Mental retardation and dendritic spines (text)</li> </ol> <p><b><u>Textbook:</u></b> Chapter 1 and 2 questions #1-7, #1-8</p> <p><b><u>Coloring Book:</u></b> 2-1 2-2 2-3 2-6 (only do terms that we talked about in class)</p>
	<p><b><u>Introductions (cont'd)</u></b> Lab safety Introductions, review syllabus, textbooks, expectations, getting to know you</p>	<p><b><u>Neurons</u></b> Soma, organelles</p>	
	<p><b><u>Introduction to Neuroscience</u></b> Pretest and laboratory safety lesson and test</p>		
<b>Tuesday</b>	<p><b><u>Neurons</u></b> Axon, dendrites, classification, glia.</p>	<p><b><u>Neurons- Create a Neuron from Play Dough</u></b> <b><u>Action Potential</u></b> Introduce action potential.</p>	<p>Your goals in this course.</p> <p><b><u>Coloring Book:</u></b> 2-7 2-8</p> <p><b><u>Textbook:</u></b> Chapter 3 and 4 questions #1-6 and 1-5</p> <p><b><u>CD-ROM from Textbook:</u></b> Animations</p> <ol style="list-style-type: none"> <li>1. Flipping Membrane Potential</li> </ol>
	<p><b><u>Neurons (cont'd)</u></b></p> <p><b><u>Phospholipid Membrane</u></b> Action Potential, Water, Ions, Phospholipid Membrane, Channel Proteins, Ion Pumps, etc.</p>	<p><b><u>Action Potential (cont'd)</u></b> Action Potential Neuron Manipulatives, Mousetrap. Discussion- 1)Text Article Tetrodotoxin p.90 2)Local Anesthesia p.95 3) Multiple Sclerosis and Demyelinating</p>	

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	<u>Phospholipid Membrane (cont')</u>	Disease p.96	2. Conducting an action potential  <b><u>Handout:</u></b> Action Potential: Applying Concepts
Wednesday	<b><u>Synapses</u></b> Introduce synapses, structure, types, Neurotransmitters	<b><u>Synapses (cont'd)</u></b> Computer Lab: Webquest- Synapse and Neurotransmitters	Review from day – go step by step through synapse.  <b><u>Coloring Book:</u></b> 1-2 1-3 1-4 2-4  <b><u>Articles:</u></b> 1. Strengthening Synapses 2. How Do Nerve Cells Communicate 3. The Human Brain  <b><u>Activity:</u></b> Action Potential Manipulatives  <b><u>Game:</u></b> Synaptic Tag!
	<b><u>Synapses (cont'd)</u></b> Computer Lab: Pick a neurotransmitter and research it	<b><u>Synapses (cont'd)</u></b> Computer Lab: Animation  Web Quest: Quiz- neurotransmitters	
	<b><u>Synapses (cont'd) Worksheet:</u></b> <b><u>Synapse Review</u></b>		
Thursday	<b><u>Human Brain</u></b> Begin Brain Anatomy	<b><u>Human Brain (cont'd)</u></b> Begin Sheep Brain Dissection	<b><u>Coloring Book:</u></b> 1-1 1-5 1-6 6-1 6-3???
	<b><u>Human Brain (cont'd)</u></b> Terminology, CNS	<b><u>Human Brain (cont'd)</u></b> Sheep Brain Dissection (cont'd)	

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	<p><b><u>Human Brain (cont'd)</u></b> Anatomy of the Human Brain, specific structures</p>		<p>9-10 9-11 9-12</p> <p><b><u>Textbook:</u></b> Chapter 7 Appendix 236-240 (self –quiz)</p>
Friday	<p><b><u>Neuropharmacology TA Teaching Class</u></b> Introduce Neuropharmacology, antagonist/agonists, PP presentation</p>	<p><b><u>Neuropharmacology (cont'd)</u></b> Computers: Webquest Part 3 Research a drug and present it</p>	<p><b><u>Sunday night:</u></b></p> <p><b><u>Textbook:</u></b> Page 121-122</p> <p><b><u>Handouts:</u></b></p> <ol style="list-style-type: none"> <li>1. Functional of areas of brain</li> <li>2. Spinal cord</li> </ol> <p><b><u>Coloring Book:</u></b> 4-1 4-2 4-3 5-29 8-1 8-2 8-3 8-4</p>
	<p><b><u>Neuropharmacology Continued</u></b></p>	<p><b><u>Neuropharmacology (cont'd)</u></b> Daphnia Lab</p>	

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<b>Week 2</b>			
<b>Monday</b>	<u><b>Neocortex/Phineas Gage Chapter 18</b></u> Neocortex/Phineas Gage PowerPoint Presentation	<u><b>BBB, Cranial Nerves</b></u> Blood Brain Barrier, Cranial Nerves begin	<u><b>Research Project:</b></u> Pick a neurological disease and research it. Develop a presentation concerning it.
	<u><b>Neocortex/Phineas Gage (cont'd)</b></u> Neocortex/Phineas Gage PowerPoint Presentation	<u><b>BBB, Cranial Nerves (cont'd)</b></u> Cranial Nerves Lab.	
	<u><b>Neocortex/Phineas Gage (cont'd)</b></u> Neocortex/Phineas Gage PowerPoint Presentation	Homonculus Activity	
<b>Tuesday</b>	<u><b>Spinal Column</b></u> Dorsal, ventral roots, cross sections, how they work together.	<u><b>Begin research:</b></u> Johns Hopkins library visit and research time	Computer Lab: Research project
	<u><b>Concussions and Neurological Disorders</b></u> Concussions	<u><b>Begin research (cont'd):</b></u> Johns Hopkins library visit and research time	
	<u><b>Concussions and Neurological Disorders (cont'd)</b></u> Neurological Disorders Presentation of Research Project		

<b>Day</b>	<b>Morning session</b>	<b>Afternoon session</b>	<b>Study hall</b>
<b>Wednesday</b>	<b><u>Sleep</u></b> EEG, begin Sleep Student presentations on topics in sleep	Computer Lab: Webquest- Teen Brain	<b><u>Articles:</u></b> 1. Sleeping Duty  <b><u>Activities:</u></b> 1. How sleepy are you? 2. How is your sleep, assessment tool  Computer Lab: Research project
	<b><u>Sleep (cont'd)</u></b> Sleep, Sleep Stages, Sleep Cycle, Why do we need sleep?, Circadian Rhythms	<b><u>Caffeine Activity</u></b> A Healthy Brain – Caffeine? The Buzz on Caffeine and Sleep	
	<b><u>Sleep (cont'd)</u></b> Computer search: Doze Family, Sleep Questionnaire		
<b>Thursday</b>	<b><u>PNS &amp; ANS</u></b> PNS vs. ANS, sympathetic and parasympathetic, neurotransmitters	<b><u>Demonstration and activity</u></b> <b><u>Functional integration of areas of the Brain</u></b>	Computer Lab: Research project
	<b><u>Reflexes</u></b> Reflex Arc PP presentation	<b><u>Video: Functional integration of areas of the brain, and activities.</u></b>  <b><u>Balance cerebellar activities</u></b>	
	<b><u>Reflexes (cont'd)</u></b> Reflex Arc PP presentation		
<b>Friday</b>	<b><u>Right vs. Left Side of Brain</u></b> PowerPoint Presentation, Right vs. Left Brain Class Activity	Lab Cow Eye Dissection	Computer Lab: Research project

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	<p><b><u>Brain Imaging Techniques</u></b> CT, MRI, PET</p>	<p>Lab Optical Illusions</p>	
	<p><b><u>Right vs. Left Side of Brain (cont'd)</u></b> Computer Lab search: Right vs. Left Brain Dominance</p> <p>Computer Lab search: Learning and Memory</p>		
<b>Week 3</b>			
<b>Monday</b>	<p>Discussion – Neuroanatomy and physiology</p>	<p>Body Worlds 2 exhibit Continued. IMAX- The Human Body</p>	<p>Computer Lab: Research project</p>
	<p><b><u>Field Trip- Body Worlds 2 at the Maryland Science Center</u></b></p>		
	<p><b><u>Science Center Scavenger Hunt</u></b></p>		
<b>Tuesday</b>	<p><b><u>Taste</u></b> Central Taste Pathways, Neural Coding of Taste</p> <p><b><u>Vision</u></b> Anatomy of the eye, image formation, accommodation of the lens, pupils, visual field, photoreceptors structure</p>	<p><b><u>Vision (cont'd)</u></b> Visual activities (acuity, depth perception, color blind, visual plasticity, astigmatism, visual field)</p>	<p>Computer Lab: Research project</p>
<b>Wednesday</b>	<p><b><u>Vision (cont'd)</u></b> Phototransduction, dark/light adaptation, retinal processing, retinofugal projection, right and left hemifields, lateral geniculate nucleus, primary visual cortex</p> <p><b><u>Touch</u></b> Activity: What does your Homunculus look like?</p>	<p>Evaluations</p> <p>Begin Research Project Presentations</p>	<p>Computer Lab: Complete research project</p>

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Thursday	Present research projects	Finish presentations, course evaluation	Movie: A Beautiful Mind
Friday	Posttest “People of Integrity” Human Senses Bingo, games, puzzles	Parent conferences, check out	

Neuroscience: Exploring the Brain, 3<sup>rd</sup> Edition. Bear, Connors, and Paradiso  
The Human Brain Coloring Book. Diamond, Scheibel, Elson  
Phineas Gage: A Gruesome but True Story About Brain Science. Fleischman

**Lesson Plan 15: Learning and Memory**

Computer Lab: Learning and Memory Activity

**Lesson Plan 15: Learning and Memory (cont'd)**

Procedural Learning, NMDA/AMPA receptors, LTP, LTD, Hippocampus, Memory Consolidation, Protein Synthesis

**Lesson Plan 15: Learning and Memory (cont'd)**

Activity: Effects of Environment on Memory

**Lesson Plan 15: Learning and Memory (cont'd)**

>> Activity: Digit span, Reward, BBC memory tests

**Smell (cont'd)**

Activity: Tasty Smells, Taste Test

Olfactory fatigue, are you a super-taster, map of tastebuds on the tongue, are you an extrovert? Take the lemon test

**Smell**

Olfaction, Organs, Transduction Process, Central Olfactory Pathways, Olfactory Information