

Center for Talented Youth
NEUROSCIENCE
 Course Outline and Lab Activity Form

Session	Topics (including activities and demonstrations)	Equipment Needs
Day 1		
Morning	<p><u>Introductions</u> Lab safety video</p> <p>Introductions, review syllabus, textbooks, expectations, getting to know you activities</p> <p>Pretest</p>	<ul style="list-style-type: none"> • Syllabus • Class expectations / rules • Tennis Ball • Ball of Yarn • Lab safety, computer, and honor code handouts
Afternoon	<p><u>Introduction to Neuroscience (cont'd)</u> -Learning Styles Inventory Neuroscience Foundations, brief history, levels of analysis, Neuroscientists</p> <p><u>Neurons</u> Soma, organelles</p>	<p>Pretest</p> <p>Learning Styles Inventory</p>
Evening	<p>Review from day 1</p> <p><u>Articles:</u></p> <ol style="list-style-type: none"> 1. History of Brain Research article from FOSS 2. A Lot of Nerve 3. Mental retardation and dendritic spines (text) with questions (from Allison) <p><u>Textbook:</u> Chapter 2 questions #1-8</p> <p><u>Brain Coloring Book:</u> 2-1, 2-2, 2-3, 2-6 (only do terms that we talked about in class)</p>	

Day 2		
Morning	<p><u>Neurons</u> Axon, dendrites, classification, glia, create a neuron out of playdough</p> <p><u>Phospholipid Membrane</u> Action Potential, Water, Ions, Phospholipid Membrane, Channel Proteins, Ion Pumps, etc.</p>	<ul style="list-style-type: none"> ○ Posterboard ○ Markers ● Playdough ● Copies of Neurons handout ● Chocolate Chip Cookies ● Copies of “A Lot of Nerve” ● Salt ● Water in beaker ● Fluid-Mosaic Magnetic Chalkboard Model ● Magnets ● Laptop projector
Afternoon	<p><u>Action Potential</u> Introduce action potential. Action Potential Neuron Manipulatives, Mousetrap. Computers: Action Potential</p>	<ul style="list-style-type: none"> ● Mousetrap ● Camera ● Laptop Projector ● Transparency of Action Potential
Evening	<p><u>Brain Coloring Book:</u> 2-7, 2-8</p> <p><u>Textbook:</u> Chapter 3 questions #1-5</p> <p><u>CD-ROM from Textbook:</u> Animations</p> <ol style="list-style-type: none"> 1. Flipping Membrane Potential 2. Conducting an action potential <p><u>Handout:</u> Action Potential: Applying Concepts</p>	
Day 3		
Morning	<p><u>Synapses</u> Introduce synapses, structure, types, Neurotransmitters</p> <p>Group activity: build a working synaptic nerve transmission</p> <p>Computers: Pick a neurotransmitter and research it</p>	<ul style="list-style-type: none"> ● Transparencies ● Laptop projector ● Handout: Synapses ● Construction paper ● Pipe cleaners ● Paper clips ● Glue ● Scissors ● Beads ● String ● Paper fasteners

Afternoon	Computers: Webquest Computers: Animation	
Evening	Review from day – go step by step through synapse. <u>Brain Coloring Book:</u> 2-4, 2-5, 2-12 <u>Articles:</u> 1. Strengthening Synapses 2. How Do Nerve Cells Communicate 3. The Human Brain <u>Activity:</u> Action Potential Manipulatives	
Day 4		
Morning	<u>Human Brain</u> Begin Human Brain Anatomy Terminology, CNS Anatomy of the Human Brain, specific structures	<ul style="list-style-type: none"> • Pears, or other fruit • Skeleton • A human brain model • Gross lab photographs of midsagittal cross section
Afternoon	<u>Human Brain (cont'd)</u> Begin Human Brain Dissection	Dissection materials Dissection manual
Evening	<u>Brain Coloring Book:</u> 1-1/2/3/5/6, 6-1, 6-3, 9-10/11/12 <u>Textbook:</u> Chapter 7 Appendix 236-240	
Day 5		
Morning	<u>Neuropharmacology</u> Introduce Neuropharmacology, antagonist/agonists, PP presentation	
Afternoon	Library orientation visit	
Sunday		
Evening	<u>Research Project:</u> Pick a drug and research it. Develop a brochure for it.	

Day 6		
Morning	<p><u>Neocortex/Phineas Gage</u> Neocortex/Phineas Gage PowerPoint Presentation Phineas Gage video- Learner.org</p>	
Afternoon	<p><u>BBB, Cranial Nerves</u> Blood Brain Barrier, Cranial Nerves begin Cranial Nerves Lab.</p>	<ul style="list-style-type: none"> • Blood Brain Barrier Handouts. • Materials for Cranial Nerves Activity. • Handout: Cranial Nerves • Develop cranial nerve pneumonic
Evening	<p><u>Textbook:</u> Page 246</p> <p><u>Handouts:</u></p> <ol style="list-style-type: none"> 1. Functions of areas of brain 2. Spinal cord <p><u>Brain Coloring Book:</u> 4-1, 4-2, 4-3, 5-29, 8-1, 8-2, 8-3, 8-4</p>	
Day 7		
Morning	<p><u>Spinal Column</u> Dorsal, ventral roots, cross sections, how they work together.</p> <p><u>Concussions and Neurological Disorders</u> Concussions Neurological Disorders Presentation of Research Project</p>	<ul style="list-style-type: none"> • Skeleton • Transparencies • Handout • Laptop Projector • List of Neurological Disorders • Disorder Information Sheet
Afternoon	<p><u>Sensory Lab- draw your homunculus</u></p>	<ul style="list-style-type: none"> • Colored pencils, drawing paper • Sensory lab instruments
Evening	<p>Computer Lab: Research project</p>	

Day 8		
Morning	<p><u>Sleep</u> EEG, begin Sleep Student presentations on topics in sleep Sleep, Sleep Stages, Sleep Cycle, Why do we need sleep?, Circadian Rhythms</p> <p>Computer Lab: Doze Family, Sleep Questionnaire</p> <p>Computer Lab: Webquest A Healthy Brain- caffeine? The Buzz on Caffeine and Sleep</p>	<ul style="list-style-type: none"> • Laptop projector • Transparencies • Handouts: <ul style="list-style-type: none"> ○ Sleepiness Diary ○ EEG Graphs ○ EEG Color Maps • Handouts: <ul style="list-style-type: none"> ○ Part 2 Webquest ○ A Healthy Brain
Afternoon	Daphnia on Drugs Lab	<ul style="list-style-type: none"> ○ Microscopes ○ Daphnia drug kit ○ Daphnia
Evening	Computer Lab: Research project	
Day 9		
Morning	<p><u>PNS & ANS</u> PNS vs. ANS, sympathetic and parasympathetic, neurotransmitters</p> <p><u>Reflexes</u> Reflex Arc PP presentation</p>	<ul style="list-style-type: none"> • Transparencies.
Afternoon	<p><u>Reflexes</u> Reflex Arc Activities</p>	<ul style="list-style-type: none"> • Reflexes/Reaction/Action Labs
Evening	Computer Lab: Research project	
Day 10		
Morning	<p><u>Right vs. Left Side of Brain</u> PowerPoint Presentation, Right vs. Left Brain Class Activity</p> <p><u>Brain Imaging Techniques</u> CT, MRI, PET</p> <p><u>Right vs. Left Side of Brain (cont'd)</u> Computer lab: Right vs. Left Brain Dominance</p> <p>Computer Lab: Learning and Memory</p>	<ul style="list-style-type: none"> • Handout: <ul style="list-style-type: none"> ○ The head with two brains ○ The left side, the right side • Computer Lab • Handouts: <ul style="list-style-type: none"> ○ Brain-Imaging Techniques ○ Imaging Techniques Questions • MRI Images

Afternoon	Laboratory activity- Taste Auditory and Smell	
Sunday		
Evening	Computer Lab: Research project	
Day 11		
Morning	<p>Discussion- You are what you eat.</p> <p>Taste Basic Tastes, Organs, Taste Receptor Cells Mechanisms of Taste Transduction</p>	<ul style="list-style-type: none"> • Whiteboard or posterboard • Transparencies • Activities Materials: <ul style="list-style-type: none"> ○ Truly Tasteless Experiment ○ Tasty Buds
Afternoon	Video- the senses- discovery	DVD player
Evening	Computer Lab: Research project	
Day 12		
Morning	<p>Vision Anatomy of the eye, image formation, accommodation of the lens, pupils, visual field, photoreceptors structure</p>	
Afternoon	<p>Vision (cont'd) Dissection of cow eye</p> <p>Vision (cont'd) Visual activities (acuity, depth perception, color blind, visual plasticity, astigmatism, visual field)</p>	<p>Dissection materials.</p> <p>Visual Perceptions Kit.</p>
Evening	Computer Lab: Research project	
Day 13		
Morning	<p>Vision (cont'd) Phototransduction, dark/light adaptation, retinal processing, retinofugal projection, right and left hemifields, lateral geniculate nucleus, primary visual cortex</p> <p>Touch Activity: What does your Homunculus look like?</p>	
Afternoon	<p>Evaluations</p> <p>Begin Research Project Presentations</p>	Evaluations.
Evening	Computer Lab: Research project	

Day 14		
Morning	Present research projects	
Afternoon	Finish presentations, course evaluation	
Evening	Cerebral response to injury DVD discovery	
Day 15		
Morning	Posttest A Beautiful Mind- Movie	Posttest. DVD "A Beautiful Mind"
Afternoon	Parent-teacher conferences, check out	