This work sheet is meant to accompany the podcast:

General Psychology Lectures by Dana C. Leighton [Tri-County Technical College, Pendleton, South Carolina]. *Episode 3: Neuroscience: Intro to neurobiology & function. Neuron anatomy, brain anatomy. Function of nervous system components.*

You may use this sheet to guide and organize your notes from this podcast. As you type in the table cells, they will expand to handle your notes for that segment.

Nervous System organization:

1.	Central Nervous System
	A. Brain
	B. Spinal column
2.	Peripheral Nervous System Purpose: • Something attached to the Central Nervous System • Something outside of CNS • Sense organs pick up from environment & send in to the CNS [bottom-up processing]
	A. Somatic Nervous System 1. Body sensations 2. Sense organs 3. Top-down processing
	B. Autonomic Nervous System
	1. Takes care of involuntary processes, i.e., heart,… 2. Things automatic, i.e., equilibrium 3. Coordinates multiple body systems

1.	Sympathetic [arousal] Purpose: • Activating • Speeds up processes • When stimulus on • Responds to hormones
2.	Parasympathetic [calming] Purpose: • Calming • Slows down processes • When stimulus passes • So we are not in a constant state of arousal • Leading to exhaustion
3.	Both work together to achieve a balance

Neuron components:

Axon: • Comes out of cell body • Connects w/ other neurons by activating dendrite of adjoining neurons • Sends info along a chain of neurons
Myelin sheath • Insulates axon, therefore takes less energy & time to move electrical charge
Misc. • Neuron cell body has cell membrane • Only has myelination if axon long or a brain neuron
2-kinds of terminals • Pre-synaptic connects to axon before synapse • Post-synaptic after the synapse or dendrite • Synapse between the axon and dendrite
Glial cells • purpose is create the material for the myelin sheath; • about half of all brain cells are glial cells
How does information get from the axon to the end of the dendrite? • Only needs small amount of electricity • Potential – the difference between 2 charges • In humans, the speed of transmission is fairly constant, except it is faster when it is myelinated • Just as in the class exercise activity, the longer the chain of neural transmission, the longer it takes
Why do we have a nervous system? [The function of neurotransmitters] • To get info from one part of our body to another • This is the function of neuro-transmitters
We have another system to get and transfer information • Endocrine system also gets info from one place to another via hormones and the blood system. • We operate both systems independently, but one of the systems can trigger/activate the other
Neurotransmitters and nutrition: • Neural transmitters have different functions; they use elect signals • One type of neuro-transmitter is serotonin – very calming – comes from turkey • Pre-cursor chemicals come frequently from the foods we eat • Nutrition impacts the types of neurotransmitters produced
How does Project Headstart impact learning and development? • By providing a healthy diet to preschool children, it helps assure that they have the nutrients necessary to build neurons, etc., therefore to develop adequate numbers of neuro-pathways, enzymes and hormones

Action potential:
- Need Action Potential for neural transmission – when enough charge builds, it then moves the charge through the axon you the adjoining dendrite.

Excess neurotransmitters:
Once used, something must be done to get rid of the excess neurotransmitters

1.	Re-uptake: Some will actually be taken back up and essentially recycled
2.	Oxidization: Enzymes in the synapse break down the bonds of the ions. NOTE: too many or too few enzymes will impact the breakdown of the neurotransmitters, affecting behavior

Endocrine system: The OTHER communication system
- Hormones also function as chemical messengers
- Hormones produced by glands [when stimulated]
- Hormones are carried between glands by the bloodstream

Compare Neurotransmitters and hormones:
- Neurotransmitters go ON fast, go OFF fast, carry info fast
- Hormones are slower; their message is carried by being absorbed by the gland; absorption is gradual
- Information that is critical cannot be transmitted by the hormone sysgtem, because it is slower

Pituitary gland
- Involved in reproduction
- In telling the body to become active
- Produces oxytoxins
- Produces follicle [as in eggs and menstruation] stimulating hormones
- Talks to the Adrenal gland

Adrenal gland
- Produces epinephrine and non-epinephrine
- Quick response
- Also produces cortizal and corticostirogen – responds to stress by causing blood sugars to increase

Brain anatomy
- Brainstem: oldest and most primitive
- 2 hemispheres – independent
- The hemispheres speak to each other through the Corpus Coliseum
- The brain gets info from the nervous syste, which connects it to the outside world

Brainstem:

- Medulla
  - Takes care of all involuntary responses
- Reticular Formation
  - Inside the medulla
  - Handles alertness and awake
- Pons
  - In front of medulla
  - Involved in sleep and arousal
  - Assists in controlling autonomic functions
  - Relays info between the cerebrum and the cerebellum

Cerebellum

- Part of the hind brain, behind the medulla
- Responsible for coordinated movement
- Motor movement

Thalamus

- On top of the brain stem
- Receiving sensory neurons from the body
- Then acts as the SWITCHBOARD, routing sensory info to the appropriate parts of the brain

Limbic system

- Located in the forebrain
- Emotion based stuff, both the processing of and the generation of

Amygdala

- Aggression
- Fear & rage

Hippocampus

- Integration of memory

Hypothalamus

- Gets info from the thalamus
- Connected to the pituitary gland
- Bodily regulation and Reproduction

Olfactory bulb

- In front of the hypothalamus
- Sends smell info to the hypothalamus

Cerebral cortex: on top of the forebrain

- Association areas

Frontal lobe:

Purpose:

- involved with planning and motivation,
- thinking complex thoughts,
- personality

Temporal lobe:
Purpose:
- Underneath the Parietal lobe, next to ear
- Primarily involved w/ learning
- Some w/memory

Parietal lobe:
Purpose:
- Primarily involved in processing sensory info, particularly visual
- Making sense out of what we see and hear and touch
- Construct ideas about our envirionment

Occipital lobe:
Purpose:
- Visual
- Gets electrical info from our eyes

Divisions of the Cerebral Cortex:
Specific parts of our body are connected and to these cortexes

Motor cortex: in back of the frontal lobe
- Directions to body from the sensory cortex
- voluntary movement

Sensory cortex: in front of the parietal lobe
- processing senses, things that we feel

Two special areas of the Frontal and Temporal lobes:

Broca's area
- In the frontal lobe
- Language production
- IF DAMAGED by stroke: might still be able to express ideas, but not hear or understand yours

Wernicke's area
- In temporal lobe
- Language comprehension
- IF DAMAGED by stroke: can understand you, but not be able to express it.

Corpus Callosum
- Provides connection between left and right hemispheres
- Also coordinates actions between them
- IF DAMAGED by stroke or split brain: both hands might operate independently, even in a contradictory manner

Brain Hemispheres	
Left	Right
• Language & Calculation • Math & Logic • Literal interpretations	• Subtle interpretations • creativity
There is no left or right brained persons; it is always some combination of both.	

Plasticity: If either hemisphere is damaged, the other side will pick up some of the other sides functions. Process whereby we can recover some from brain damage; it is better in children.
Cerebral-spinal fluid: This provides nutrients and cushioning; if it damaged, it can cause problems such as encephalitis
Brain damage

Stroke: When blood flow is cut off to a portion oif your brain, it leaves the brain cells w/out nourishment
Aphasia: If part of the brain is damaged, information may seem incomplete and difficult to perceive and piece together