

# Neuroscience Cheatsheet

## Brain Anatomy

### Brain regions

- Cerebrum: responsible for conscious thought and movement
- Cerebellum: responsible for coordination and balance
- Brainstem: controls autonomic functions such as breathing and heart rate
- Limbic system: controls emotions and memory

### Neurons

- Dendrites: receive signals from other neurons
- Cell body: contains the nucleus and other organelles
- Axon: transmits signals to other neurons
- Synapse: the gap between neurons where chemical signaling occurs

### Neurotransmitters

- Acetylcholine: involved in muscle control and memory
- Dopamine: involved in reward and motivation
- Serotonin: involved in mood and emotion
- GABA: inhibitory neurotransmitter that reduces neural activity

## Experimental Methods

### Electrophysiology

- Measures the electrical activity of neurons
- Intracellular recording: measures the voltage across the membrane of a single neuron
- Extracellular recording: measures the voltage of many neurons in a specific area

### Imaging

- Structural imaging: provides information about the brain's anatomy
- Functional imaging: provides information about the brain's activity
- Examples: MRI, CT, PET, fMRI

## Common Techniques

### EEG

- Measures the electrical activity of the brain
- Non-invasive and relatively cheap

### TMS

- Uses a magnetic field to temporarily disrupt brain activity
- Non-invasive and used in both research and therapy

### Optogenetics

- Uses light to control the activity of neurons
- Invasive and used primarily in research

## **Diseases and Disorders**

### **Neurodegenerative Diseases**

- Alzheimer's disease: gradual loss of memory and cognitive function
- Parkinson's disease: loss of dopamine-producing neurons leading to motor impairments
- Huntington's disease: genetic disorder that causes involuntary movements and cognitive decline

### **Mental Disorders**

- Schizophrenia: characterized by abnormal thoughts and perceptions
- Depression: characterized by persistent sadness and loss of interest in activities
- Anxiety disorders: characterized by excessive fear and worry

## **Resources**

- [Society for Neuroscience](#)
- [Neuroscience Online](#)
- [BrainFacts.org](#)