Objectives
- To sketch and identify the most important micro-structures of the neuron.
- To associate the accessory cells of the nervous system with a diagram.
- To outline the steps of the nerve impulse generated by an Action Potential.

The Neuron
- Dendrites
- Cell Body
- Axon
- Myelin

Characteristics of the Neuron
- Structural units of the nervous system.
- Conducts messages via nerve impulses.

Characteristics
- Large and complex
- High metabolic rate
- Amitotic (don’t divide)
- Long lived

The Nervous Impulse
- The balance of the electrical charges on either side of the neuron’s PM influences the membrane potential MP.
- Resting MP is -70 mV.
- Changes in the MP act as signals for receiving, integrating and sending information.
- Occurs due to differences in ion concentrations.
Movement of ions

Chemical-gated channels
- respond to chemical transmitters.

Voltage-gated channels
- respond to membrane voltage channels.

The ionic environment:

- More Na+ outside than inside.*
  Enters via voltage-gated channels.
- More K+ inside the neuron.

Nerve Impulses

Action Potential: occurs when there is a change in polarity in the axon’s membrane. “All or none”

- Depolarization - When the inside of the axon first becomes positive compared to the outside of the cell. Na+ ions move to the inside of the axon.

- Repolarization - When the inside of the axon becomes negative again, after AP. K+ ions move to the outside of cell. Neuron can’t respond to new stimuli.
Action Potential

Very fast – 1/500th of a second!
Movement along the axon – cascade of charge.
Does NOT decrease in strength with distance!
All or none principle
Propagation occurs AWAY from point of origin.
Saltatory conduction in myelinated neurons.

What causes an Action Potential?

Stimuli
I. Sensory: Pressure, light, heat, chemicals/odor, sound waves.
II. Neurotransmitters: chemicals released from other nearby neurons.

Phenomenon of threshold.

Restoring Resting Potential

Role of Sodium/Potassium pump:
Maintains resting potential.
3 Na+ out for every 2 K+ pumped back
Net result is interior of cell is more negative restoring “energy potential.”