The Neuroscience Teaching Team program is comprised of 3 modules. The three components are designed to give a basic understanding of how the brain is organized and how it helps us interact with our environment in a number of ways.

**BRAIN ANATOMY** - In this module, students will be given an overview of brain anatomy

**Concepts addressed:**
- Skull contains brain, tissue, cells
- Neuron is the main kind of cell
- Parts of a neuron: Cell body (with nucleus), dendrites, axon
- Neurons communicate with each other and form networks throughout the brain and body to send information
- 100 billion neurons in your body, are very small
- Spinal cord connects brain to rest of body through nerves
- Nerves branch off of the spinal cord to travel to the rest of your body (such as your muscles)

**Parts of the brain:**
- meninges, optic nerves, folding of cerebral cortex, cerebellum, brain stem, corpus callosum, blood vessels, white matter, gray matter, left and right hemispheres, frontal, occipital, parietal, and temporal cortex, visual, motor, sensory, auditory cortex, hippocampus

**Demonstration:**
If possible, students will be shown a model of the brain and/or spinal cord

**VISUAL MOTOR ADAPTATION** - A demonstration will show students how the brain can adapt to change in visual input.

**Concepts addressed:**
- Neural adaptation: neural, neuron, neurology, adaptation
- Motor movements
- Cerebellum helps your brain adapt your motor movements and learn new ones

**Prisms**
- Scientific method as it relates to our demonstrations:
- Observation, hypothesis, experiment, conclusion
- Subjects, experimenters, baseline

**Demonstration 1: How long does it take to adapt to prism goggles?**
Students sit in two rows, each facing a partner
Each tries to touch the finger (target) of partner, then their own nose several times, first without goggles, then with goggles
After putting on goggles, students miss target, but gradually adapt to goggles and are able to touch target finger
After taking off goggles, students miss target since they have adapted goggles, gradually adapt back to normal

**Demonstration 2: How does your cerebellum help you to adapt to prism goggles when throwing?**
Student throws clay balls at a target without goggles, then with goggles while other students keep track of throws with chalk/marker
After putting on goggles, student misses target off to the side, but gradually hits closer to target as they adapt to glasses
After taking off goggles, student misses target off to the other side since they have adapted to goggles, gradually adapt back to normal

**Demonstration 3: Is adaptation to goggles specific to one movement (overhand throw), or does it extend to other movements (underhand throw)? (optional)**
Student throws clay balls at a target overhand then underhand without goggles, then the same with goggles
After student adapts overhand throw, underhand throw is off target but eventually adapts as well
Neural adaptation is movement dependent (you have to relearn each new movement)

**PROPRIOCEPTION – THE 6th SENSE** - Students will be introduced to the 6th sense, proprioception, and will see how it helps us to interact with our environment through a demonstration.

**Concepts addressed:**
- 5 senses
- Proprioception is how brain senses where our body is in space
- Muscles
- Motor neurons run through spinal cord to connect muscles to brain
- Connections between nerve and muscle

**Muscle spindles sense muscle length**
- Stimulation of muscle spindles tells brain length of muscles
- Triceps, biceps, Achilles tendon
- Sense of balance, inner ear
- Scientific method as it relates to our demonstrations:
- Observation, hypothesis, experiment, conclusion

**Demonstration 1: What do muscle spindles do?**
Student stands with arm out to side, with eyes closed, move finger as close to nose as possible without touching it, gets very close.
Now use 'stimulator' to stimulate tricep while performing same task, student's finger ends up farther out in front of the face
Stimulator excites muscle spindles, tricks brain into thinking the muscles are longer than they really are

**Demonstration 2: What is the result of stimulating the Achilles tendon?**
Student stands with eyes closed, feet together, head tilted back, volunteers in front and back to catch student
Use stimulators on the Achilles tendon, volunteer falls backwards
Stimulator excites Achilles tendon, make brain think muscles longer than they really are, and that student was leaning forwards, so student compensates by pushing down with the toes, or trying to shorten the Achilles tendon, then they fall backwards