

## BrainU 101 Content (Italicized names refer to lesson plans available at [www.brainu.org](http://www.brainu.org).)

### Basic anatomy and physiology of the brain

Objective: To understand the structures and functions of the brain

Methods: Lectures, hands-on activities

Lesson plans/activities:

*Explain Your Brain* assembly

*Explain Your Brain exhibit hall activities*

*Sheep Brain Dissection video*

*What's in a Brain?* (sheep brain dissection) Teacher, Student Guides

### Basic neural anatomy and physiology

Objective: To understand the structure and functions of neurons

Methods: Lectures, animations, kinesthetic and hands-on activities

Lesson plans/activities:

*The Action Potential and The Synapse* flash animations

*Bead Neuron model* Teacher, Student Guides

*Close-up of the Nervous System* (slides) Teacher, Student Guides

*Connect the Neurons* Teacher, Student Guides

*Physical Neuron Blocks* Teacher Guide

*Virtual Neurons* Teacher, Student Guides

### Historical perspective on the development of the brain, the field of neuroscience

Objective: To give social context of the field of neuroscience

Method: Lecture

Lesson plans/activities: None

### Introduction to sensory and motor systems

Objective: To illustrate how sensory system bring info to brain

Methods: Lectures, lab tours, hands-on investigations

Lesson plan/activity:

*Altered Reality (visual motor learning)* Teacher, Student Guides

### Neuroscience resources: internet, museum, people

Objective: To highlight resources available to participants

Methods: Internet tours, discussion

Lesson plans/activities:

Eric Chudler's website: <http://faculty.washington.edu/chudler/flash/brainu.html>

### Higher level brain processes

Objective: To explore what thinking is, brain size in relation to intelligence

Methods: Class discussions

Lesson plans/activities:

*What is Thinking?, Is a Cow a Tool? and Brains and Brain: Is Bigger Better?*

from Think Tank curriculum at the Smithsonian National Zoological Park

<http://nationalzoo.si.edu/Education/ClassroomResources/CurriculumGuides/default.cfm>

### Introduction to invertebrate nervous systems

Objective: To understand how invertebrates are used as model neural systems

Methods: Hands-on activities, discussions

Lesson plans/activities:

*Caeno-What? And Chemotaxis Experiment* Teacher, Student Guides

Introduction to learning and memory, the concept of plasticity  
Objective: To understand how synapses are altered by experience  
Method: Flash animation, discussion  
Lesson plan/activity:  
*Synapse Change! Flash animation*

Introduction to adolescent brain development  
Objective: To introduce neural reorganization & its behavioral effects during adolescence  
Method: Lecture  
Lesson plans/activities: None

Introduction to brain imaging  
Objective: To understand the differences between various brain imaging techniques  
Method: Lecture on techniques, tours of MRI and fMRI facilities  
Lesson plan: None

Examples of brain diseases and treatment  
Objective: To understand the neural basis of Alzheimer's, stroke, Parkinson's  
Methods: Lectures  
Lesson plans/activities: None

## **BrainU 101 Pedagogy/Science Processes**

Introduction to the importance of hands-on investigations  
Objective: To illustrate the importance of real contact with the subject to develop in depth understanding.  
Methods: Hands-on activities  
Lesson plans/activities: None  
Compare pieces of real apples for each participant, a picture of an apple, and a picture of the word apple, asking people to list as many words as they can for each "apple example"

Introduction to inquiry investigations using neuroscience activities  
Objective: To conduct an inquiry investigation, highlighting developing testable questions  
Method: Hands-on activity  
Lesson plan/activity:  
*Altered Reality (visual motor learning) Teacher, Student Guides*

Introduction to science journals  
Objective: To use journals to record experiences, data from investigations  
Methods: Informal and formal note taking  
Lesson plans/activities: None

Linking scientific content to classroom practice  
Objective: To link neuroscience content talks with classroom practice  
Methods: Informal and formal discussions  
Lesson plans/activities: None  
Integrate using content in context to teach (e.g. identifying a brain structure by its name and its function while conducting the sheep brain dissection instead of giving a list of anatomical words with their function on a worksheet.)

Lab tours, informal conversations with researchers

Objective: To introduce teachers to the research environment and researchers to the education environment

Methods: Lab tours, informal conversations

Lesson plans/activities: None

Networking/sharing ideas with colleagues

Objective: To provide opportunities to process and share information

Methods: Informal and formal conversations

Lesson plans/activities: None

Neuroscience project activities alignment with state standards

Objective: To explicitly link neuroscience activities with state educational standards

Methods: Discussions

Lesson plans/activities: Standard alignments are listed at:

[www.brainu.org/resources/MNSTDS](http://www.brainu.org/resources/MNSTDS)

Discussion of models (e.g. bead neuron model, c. elegans model system)

Objective: To identify and understand the strengths and weakness of models used during workshop and scientific model in general

Methods: Discussion

Lesson plans/activities: None

Action Plan

Objective: To develop a plan to implement neuroscience activities in participants classrooms

Methods: Informal and formal discussions, planning time, short presentations of plan ideas at end of workshop, final draft due 2 weeks after workshop completion

Lesson plans/activities: Action Plan write-up listed below

## Brain U 101 Action Plan

Integrating Neuroscience Topics into Your Curriculum  
(Components indicated in bold are required.)

**Teacher Information:** (Name, School, School Address, school phone, e-mail)

**Class and Grade Level:**

**Situation:**

Set the conditions for your neuroscience plan. (Example: This unit is designed for my five, 7<sup>th</sup> grade life science classes to complete in two weeks of studying the brain and nervous system.)

**Learning Goal:**

Why are you adding (or enriching) neuroscience into your curriculum? What is the big idea for your students? “This neuroscience lesson/unit is designed for students to . . .”

**Integration Target:**

How and when will neuroscience and related health concepts be incorporated into the curriculum? What is the context? Where does neuroscience fit in your “master plan” for the year? **Include a short list of key concepts and vocabulary to be discovered and/or used by students.**

**Standards:**

What MN science standards are supported by this lesson/unit?

**Student Objectives:**

Students will be able to . . . What measurable skills and content will students be able to demonstrate by the end of their investigations into neuroscience? Be specific; less is more.

**Assessment Strategies:**

List specific assessment strategies to be used. These assessments should support your objectives. Include formative and well as summative indicators.

**Implementation Timeline:**

List specific teaching methods and neuro-related investigations to be used. **Include strategies to determine prior knowledge, engage students in the topic, and develop student questions.** Present as a list, in a proposed sequence, with an approximate date and time allotment for each. Include key planning deadlines in this list.

Material/Equipment Needs:

Experimental Limitations for Students:

Closure Methods:

**Inquiry Integration:**

Briefly explain how the design of this lesson/unit is inquiry based. Provide specific indicators or strategies used to support student inquiry.