While Class was entering

www.youtube.com/watch?v=GlGqp6_PG6k  public outreach winner 2010

Inception Trailer

http://www.youtube.com/watch?v=66TuSJo4dZM
Inception, Total Recall, & The Brain: An Introduction to Neuroscience

Neal G. Simon, Ph.D.
Professor
Dept. of Biological Sciences
Areas of the brain (side view)

Frontal lobe
Planning/reasoning, problem-solving, recognising and regulating emotion, social skills.

Parietal lobe
Recognising sensations and body position, recognising objects, spatial judgements, understanding time.

Temporal lobe
Understanding language, processing auditory information, organising information, memory, learning.

Occipital lobe
Integrating and processing visual information (colour, shape, distance).

Brain stem
Regulates breathing, body temperature, heart activity etc.

Cerebellum
Controls balance and muscle co-ordination.
Defined and numbered by the Korbinian Brodmann based on the cytoarchitectural organization of neurons he observed in the cerebral cortex using Nissl stain.

Source: spot.colorado.edu
Topics We Would Cover

- Introduction: Brain Basics, Development
- Sensing, Thinking, and Behaving: Senses and Perception; Learning, Memory, and Language; Movement; Sleep
- Lifespan Considerations: Stress, Aging
- Research: Kinds of research
- Diseases and Disorders: Childhood; Addiction; Degenerative; Psychiatric; Injury and Illness
- Treating Brain Disorders: Potential Therapies; Neuroethics

After Brain Facts, Society for Neuroscience
The Neuron (1)*

Cell body (the cell’s life-support center)

Dendrites (receive messages from other cells)

Axon (passes messages away from the cell body to other neurons, muscles, or glands)

Myelin sheath (covers the axon of some neurons and helps speed neural impulses)

Terminal branches of axon (form junctions with other cells)

Neural impulse (electrical signal traveling down the axon)

*the next 2 slides were combined & animated in the lecture
Neuronal Communication: Electrical & Chemical (1) *

**Action potential**

- **Depolarization** (opening of voltage gated Na⁺ channels)
- **Hyperpolarization** (Voltage gated K⁺ channels remain open after the potential reaches resting level)
- **Repolarization** (closure of Na⁺ and opening of K⁺, voltage gated channels)

*the next 3 slides were combined & animated in the lecture*
Case of Henry Molaison

HM (1926-2008) underwent brain surgery in 1953 to contain epileptic seizures that had become critically debilitating. The intervention brought some relief from convulsions, but these positive results were overshadowed by an astonishing side effect. Soon after the operation, it became apparent that he could no longer retain new information— he did not remember newspaper articles he had just read, nor the crossword puzzles he had solved; otherwise, he was completely normal. Since the time of the surgery, more than five decades of scrupulous neuropsychological research examined the nature of patient H.M.'s amnesia which was both persistent and remarkably selective.

Brain Observatory at UC-San Diego

Jacopo Annese, Ph.D
Director
Video Clips from The Brain Observatory”

3D rotating image of the brain

http://thebrainobservatory.ucsd.edu/content/3d-reconstruction-brain-mri-data

Sectioning HM’s Brain

http://thebrainobservatory.ucsd.edu/content/120209
Limbic System: Emotional Circuitry

CNS Disorders

1. Affective Illness

2. Neurodegenerative Diseases
PTSD: A Complex Disorder with Frequent Co-morbidities

- **Major Symptoms**
  - Hyperarousal to Traumatic Memory
  - Emotional Dysregulation

- **Common co-Morbidities**
  - Major Depression
  - Anxiety Disorders
  - Impulsivity/Violent Behavior
  - Substance Abuse
PTSD Major Symptomology

- **Re-experiencing** symptoms are intrusions of the traumatic memory in the form of distressing images, nightmares, or dissociative experiences, such as flashbacks.

- **Avoidance** symptoms include actively avoiding reminders of the traumatic event, including persons, places, or things associated with the trauma, and more passive behaviors reflecting emotional numbing.

- **Hyperarousal** symptoms, such as insomnia, irritability, impaired concentration, hypervigilance, and increased startle responses, concern more “physiologic” manifestations of trauma exposure.

*These symptoms must impair social, occupational, or interpersonal function, and persist in tandem for at least a month following the trauma.*

Yehuda, 2009
Underlying Neurobiology: Anatomy & Neurochemistry