

Brain Camp, 2009



Brain Camp is a residential science camp for motivated, energetic students who are interested in the wonders of the brain. Through hands-on laboratory experiences, students will explore the anatomy, physiology, and development of the brain.

Brain Camp is a one-week summer experience for high school students who will be beginning their junior or senior year in fall, 2008. Participation in Brain Camp is free, pending acceptance (see application on reverse). All expenses, including housing, meals, and social activities are included. This camp is funded by a generous gift from **The Sentience Foundation**.

During Brain Camp, participants will live in supervised student housing on the Muhlenberg College campus, and attend interactive classes on brain anatomy, neural function, and biological basis of behavior. In the afternoons, participants will join the laboratories of Muhlenberg College faculty and pioneer independent research in neuroscience.

Each day at **Brain Camp** includes:

• Morning sessions that demonstrate **hot topics** in neuroscience through hands-on activities:

- A. Exploring Brain Anatomy
Dr. Mary Constant Byrne, Neuroanatomist
- B. This is Your Brain on Drugs
Dr. Jeremy Teissere, Neuropharmacologist
- C. The Neuroscience of Vision
Dr. Jordanna Sprayberry, Neurophysiologist
- D. Liking and Wanting: Two Sides of Reward
Dr. Jeff Rudski, Behavioral Neuroscientist
- E. Memory and Amnesia
Dr. Gretchen Gotthard, Behavioral Neuroscientist
- D. Animal Behavior
Dr. Paul Meier, Neuroethologist
- F. Sensation, Perception, and Cognition
Dr. Laura Edelman, Cognitive Neuropsychologist

• Afternoon **research projects** that let students design their own experiments. Projects are directed by faculty from the neuroscience program at Muhlenberg College.

• Evening **social activities** including welcome barbecue, outdoor movies, summer theatre, Dorney Park, and more!

Research Projects. Please indicate your **top three** choices on the application form.

A. Neurobiology of Learning and Memory

A growing literature in the field of learning and memory shows that even well-established memories can be made vulnerable and can be "erased" through the use of certain drugs (e.g., protein synthesis inhibitors, NMDA antagonists, and beta-blockers). Students will test this hypothesis by designing and running a study that involves training rat subjects to dig in cups of sand to find buried rewards and then administering a memory-blocking drug. **Dr. Gretchen Gotthard**

B. Your Brain on Music

Extensive research has been done on the effects of music and musical training on the human brain. Evoked potential and fMRI studies have shown that individuals with musical training process music in different areas of the brain (both the left and right hemisphere) than non-trained individuals (who process it only in the right hemisphere). In addition, music has been shown to influence memory, emotions, arousal, and information processing. Students will design an experiment to investigate the influence of music on behavior and cognition. **Dr. Laura Edelman**

C. Drug-Receptor Interactions

The GABA(A) receptor is the major inhibitory neurotransmitter receptor in the central nervous system; it is a natural target of anxiety-reducing and sleep-inducing drugs. Students will examine the effects of drugs and modulators on the function of this important neurotransmitter receptor. **Dr. Jeremy Teissere**

D. Insect Sensory Behaviors

Insects rely on complex sensory neuron circuits to visually track flowers during feeding and flying behaviors. Students will design and perform research that examines how the function of these sensory neurons processes visual information and allows insects to behaviorally respond to flower movement. **Dr. Jordanna Sprayberry**

E. Neurobiology of Behavior

Animal behavior is a product of chemical signals interacting with specific regions within the brain in response to environmental signals. Students will investigate the physiology of reproductive behavior at multiple levels: the stimuli that elicits the behavior, the chemical signals within the brain, and how the behavior affects an animal's reproductive success. **Dr. Paul Meier**

F. Addiction

It's well known that people can get addicted to drugs. But what about addictions to other things? There are reports of gambling addictions, shopping addictions, and even addiction to Harry Potter. For this project, we're going to examine addiction to something even more powerful: Facebook/Twitter/text-messaging. Using past research, we'll create an addiction survey, post it online, recruit friends and family to participate, and learn how to do some simple statistics to analyze what we find. **Dr. Jeff Rudski**

At the conclusion of Brain Camp, students will present the outcome of their research in a public poster session. A catered lunch will be available for participants and their families.

Application Form

Deadline: May 15, 2009

Mail the following form with

- (1) a copy of your high school transcripts
- (2) a letter of recommendation from a high school teacher to:

Dr. Mary Constant Byrne
Muhlenberg College
Department of Biology
2400 Chew St
Allentown, PA 18104

Name

Address

Phone

School

Expected Year of Graduation _____

Research project: Please rank your top 3 choices by writing the corresponding project letter below!

1. _____
2. _____
3. _____

For more information about Brain Camp visit our website at
<http://www.muhenberg.edu/depts/neuroscience/braincamp/>

Any questions? Contact Dr. Mary Constant Byrne (Brain Camp Director) at byrne@muhenberg.edu



BRAIN CAMP
MUHLENBERG COLLEGE
JULY 12-17, 2009

Brain Camp is a science camp for high school students interested in the biology of the brain. Over the course of one week, students will explore the inner workings of the nervous system and direct their own research project.