Behavioral Neuroscience (BCPSY 1117, 1119)  
Course Syllabus

Instructor: E’mett McCaskill, Ph.D.  
Email: emccaski@barnard.edu  
Phone: 212-854-8601

Course Description

Behavioral Neuroscience is the discipline dedicated to the scientific investigation and advancement of theory pertaining to processes underlying the biological basis of human behavior. The field is interdisciplinary in approach requiring some knowledge of psychology, biology, chemistry, neuropharmacology, biochemistry, and the clinical sciences (e.g., neurology and neuropsychiatry). The goal of this course is to provide a comprehensive introduction to behavioral neuroscience beginning with a detailed review of the nerve cell, conduction and neurotransmission. Next, we build upon this smallest unit of the nervous system through study of neuroanatomy, structure/function relationships and the developmental evolution of the whole brain. As the course proceeds, these foundational topics will nurture understanding of the neural bases of sensation, perception, cognition and emotion as well as ingestive, sexual and addictive behavior.

The course takes a research based approach through interpretation, analysis and application of experimental findings. Additional insight will be gained by examination of neural dysfunction in neurological and neuropsychiatrically impaired clinical populations. By the conclusion of the course students will have a solid background in concept and theory, research methodology, and application of neuroscientific knowledge to normal behavior and clinical disorders/syndromes. Finally, in an age of rapid neurotechnological advancement, a course in neuroscience would be incomplete without reflective consideration of ethical issues surrounding our efforts to understand the brain, its function and impact on behavior. Therefore, neuroethical dilemmas will be highlighted and integrated when relevant to discussion topics.

Course Requirements

Examinations

Students are required to complete two midterms and a final examination. If a student is unable to take an exam, documentation from a physician or college dean must be provided.

Extra Credit

Students may opt to complete an extra credit paper due at the final exam. A more detailed description of this assignment will be available in the first class session.

Attendance/Participation

A portion of each class will be taught in lecture format, however there will be many opportunities for class discussion. Active participation from each student will inevitably contribute to a more engaging and entertaining classroom experience for all. Consistent attendance and preparation prior to lecture is required and will not go unnoticed.

Extra Help
I am available for extra help during office hours and by appointment. Please do not hesitate to ask for assistance if you are experiencing difficulty with the course material. I greatly enjoy talking with students about life at Barnard and Columbia and/or future career interests.

**Readings**

*Primary Textbook*

The required text for the course is Carlson, N.R. (2006). *The Physiology of Behavior, 9th Edition*. Allyn and Bacon Publishers: Boston, Massachusetts. It may be purchased at the Columbia Bookstore or from booksellers online. All lecture material will be based on the most recent edition. It is strongly encouraged that you do not use an older text edition.

*Supplemental Readings*

Links to original research journal articles and clinical case material will be available on the Courseworks website.

**Grading**

Your final average will be computed as follows:

- Exam One: 30%
- Exam Two: 30%
- Final Exam: 40%

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**Course Content**

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| 2       | Research Methods in Behavioral Neuroscience  
*Neuroethics Spotlight: Ethical Issues in Animal and Human Experimentation* |
| 3       | Organization of the Nervous System:  
Brain, Nerve Cells, Genes and Behavior |
| 4       | Structure of the Nervous System: Neuroanatomy  
*Neuroethics Spotlight: Ethical Issues and Neuroimaging* |
| 5       | Neural Conduction and Synaptic Transmission, Hormones  
*Discussion Topic: Psychoactive Drug Action* |
| 6       | Neurodevelopment  
*Clinical Case Analysis: Hydrocephalus and Fetal Alcohol Syndrome* |
| 7       | Sensory and Perceptual Processes  
*Clinical Case Analysis: “Aura” and Migraines* |
| 8       | Control of Movement  
*Clinical Case Analysis: Parkinson’s Disease and Tourette’s Syndrome  
Neuroethics Spotlight: Ethical Issues and Neurotransplantation* |
| 9       | Ingestive Behavior  
*Clinical Case Analysis: Bulimia Nervosa and Neurobiological Theory* |
| 10      | Sleep and Biological Circadian Rhythms  
*Clinical Case Analysis: Pharmacological Treatments for Insomnia* |
| 11      | Hormones and Reproductive Behavior |
| 12      | Memory, Learning and Neuroplasticity  
*Clinical Case Analysis: Patient H.M. and the Amnesias* |
| 13      | Cognition, Intelligence and Consciousness  
*Clinical Case Analysis: The Split Brain Patient* |
| **Class Session** | **Lecture/Discussion Topic** |
| 14      | Emotion |
| 15      | Disorders of Thought and Volition: Schizophrenia |
Session 16  
Disorders of Anxiety and Mood: Unipolar and Bipolar Depression
Anxiety Disorders

*Discussion Topic: Psychopharmacology as a tool for understanding the neurobiology of psychopathology*

**Required Reading**

**Session 1 and 2: Welcome and Introduction/Research Methods**

Primary Text (Carlson): Chapter 5: Methods and Strategies of Research

**Session 3: Organization of the Nervous System**

Kolb and Whishaw (2006). *An Introduction to Brain and Behavior*: Chapter 2: How is the Brain Organized?

**Session 4: Structure of the Nervous System: Neuroanatomy**

Primary Text (Carlson): Chapter 3: Structure of the Nervous System


**Session 5: Neural Conduction and Synaptic Transmission, Hormones**

Primary Text (Carlson): Chapter 2: Structure and Functions of Cells of the Nervous System

Chapter 4: Psychopharmacology

**Session 6: Neurodevelopment**


Kolb and Whishaw: Chapter 3: How Does the Brain Develop?


**Session 7: Sensory and Perceptual Processes**

Primary Text (Carlson): Chapter 6: Vision

Chapter 7: Audition, Body Senses, and Chemical Senses

**Session 8: Control of Movement**

Primary Text (Carlson): Chapter 8: Control of Movement


**Session 9: Ingestive Behavior**

Primary Text (Carlson): Ingestive Behavior


**Session 10: Sleep and Biological Circadian Rhythms**

Primary Text (Carlson): Sleep and Biological Rhythms


**Session 11: Hormones and Reproductive Behavior**

Primary Text (Carlson): Chapter 10: Reproductive Behavior

**Session 12: Memory, Learning and Neuroplasticity**

Primary Text (Carlson): Chapter 13: Learning and Memory


**Session 14: Emotion**

Primary Text (Carlson): Chapter 11: Emotion

**Session 15: Disorders of Thought and Volition: Schizophrenia**

Primary Text (Carlson): Chapter 16: Schizophrenia and Affective Disorders

**Session 16: Disorders of Anxiety and Mood: Unipolar and Bipolar Depression, Anxiety Disorders**

Primary Text (Carlson): Chapter 17: Anxiety Disorders, Autistic Disorder, Attention-Deficit/Hyperactivity Disorder, and Stress Disorders


**WELCOME TO THE COURSE!!!!**