

NEUROPSYCHOLOGY 830:310 SUMMER 2010
JUNE 1 – JULY 9

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Course Description

Neuropsychology is the study of brain-behavior relationships in which the focus is entirely on the human brain. It is a branch of neuroscience that traditionally has relied more on clinical case studies as a source of information for identifying the functional significance of various regions of the brain, than basic laboratory research using animal models, which in and of themselves have provided (and continue to provide) a wealth of information that has been extrapolated to human brain function. In recent years, the ascendance of cognitive neuroscience, a branch of cognitive science that correlates brain activity with normal psychological processes in healthy, unimpaired human and non-human primate subjects, has served to extend the domain of neuropsychological investigation. In essence, whether it's called neuropsychology, behavioral neurology, or cognitive neuroscience, the ultimate goal is prediction and understanding of what parts of the brain serve as the basic substrates for measureable ongoing behavior. And as such, this information serves to aid the diagnosis and treatment of many different behavioral disorders ranging from acquired or inherited deficits in language and cognition, to severe neuropsychiatric conditions such as Alzheimer's dementia and schizophrenia. The course will provide the basis for appreciating the many different ways in which behavior has been related to specific regions of the human brain, and will cover basic neuroanatomy, neuropsychological testing, the newer methodologies used by cognitive neuroscience, such as neuroimaging, and proceed to a more detailed description of how the brain allows for the expression and processing of emotion, language, thought, and memory.

Learning Goals

After taking this course, students should be familiar with:

1. Methods for assessing normal and abnormal brain function at the structural and physiological level in human and non-human primates
2. Neuropsychological approaches to assessing the consequences of brain damage
3. The functional properties of of the cerebral cortex in human and non-human primates
4. Functional differences between the left and right cerebral hemispheres
5. The relationship of neuropsychology to cognitive neuroscience approaches to understanding
 - a. Sensation and Perception
 - b. Goal-directed actions
 - c. Attention
 - d. Learning and memory
 - e. Emotion
 - f. Language
6. The neurocognitive basis of psychiatric disorders

Syllabus: Neuropsychology, Summer 2010

Assessment

There will be three exams. Each exam will be a mixture of written and multiple choice questions. The first exam will account for 25% of the total grade. Exam 2 will account for 35% of the total grade. The Final Exam (or 3rd Exam) will be worth 40% of the total grade, and will involve knowledge of the required reading (*Phantoms in the Brain* – see section on required reading).

Makeups: If an exam is missed for a legitimate and verifiable reason, the student must sit for the makeup within three weekdays of the scheduled date for the missed exam. Written and signed documentation will be required, and since the makeup will allow for more study time, the written component of the exam will look for evidence of greater and more precise understanding. Rutgers athletic obligations, religious events, weddings etc that are going to interfere with taking the scheduled exams will require that you take the exam earlier than scheduled. It is up to you to anticipate the conflict, and let me know about these upcoming events so I can administer the exam earlier.

Required Reading

Phantoms in the Brain: Probing the Mysteries of the Human Mind; by V.S. Ramachandran, 1999.

The above book should be read by students in order to appreciate certain clinical aspects of neurological disorders. It is an award-winning book, and based on feedback, universally “loved” by hundreds of students who have taken Neuropsychology with Professor Kusnecov. (NOTE: Ramachandran has a BBC documentary on the book, which you can watch on YouTube – just go to the site and type in the name of the book). The book does not provide a formal, textbook style description of how neuropsychology as a discipline is conducted. However, it does leave the reader appreciative of the intriguing nature of the brain, as well as being knowledgeable of some clinical conditions that will be covered in class.

Note: Take-home questions will be provided to help prepare students for questions in the Final Exam based on the book. Material in the book that is not addressed in lecture will be the student’s responsibility (but the take-home questions should not leave you stranded thinking “what do I need to know?”).

Optional Reading

Purchase of a formal textbook on neuropsychology is not required, since the lectures and lecture outlines (posted on sakai) will be sufficient to get through the course. There is a wealth of information on the internet, such that a student merely needs to type in a keyword (eg., ataxia or apraxia) to get a host of links defining these terms.

However, if a student wants to know more about specific terms encountered in the course, she/he may benefit from having a copy of the following:

Beaumont, J. G., Kenealy, P.M., & Rogers, M.J.C. (1999). *The Blackwell Dictionary of Neuropsychology*. Malden, Massachusetts, Blackwell Publishers.

Further, if a student definitely must have a textbook on neuropsychology (and few fit my approach), then the following is worth purchasing (there is a more expensive 6th edition out now, but not necessary if you are purchasing to obtain a secondary source to the lectures):

Kolb, B., & Wishaw, I.Q. (2003). *Fundamentals of Human Neuropsychology* (5th edition). Freeman.

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Finally, any textbook (completely optional) on physiological psychology or biological psychology should alleviate concerns about understanding the neurobiology (eg., that used for Physiological Psychology [830:313] at Rutgers is *Physiology of Behavior* by Neil Carlson; this book will be placed on reserve at the library, since it covers the neuroanatomy and some other physiological aspects that students may find difficult; many used copies are available through your favorite vendor, and 8th through 10th editions of the book will be fine).

Outline of Course Lectures and Dates of Exams

Section I: History, Neuroanatomy and Methodology

Lecture #	Topic		
1	Tue	1-June	Overview and Introduction
2	Wed	2-June	History of Neuropsychology: Localization of function vs Integrative Function
3	Thur	3-June	The Nervous System: Central vs Peripheral Nervous System
4	Mon	7-June	Brain Structure and Anatomy
5	Tue	8-June	Methodology: Clinical Conditions (eg., Strokes, Infection, Trauma)
6	Wed	9-June	Methodology: Measurement of Brain Function (eg., Neuroimaging; EEG)
7.	Thur	10-June	Methodology: Neuropsychological Assessment
8.	Mon	14-June	EXAM 1 (25% of total grade)

Section II: Cognitive, Perceptual and Motor Functions of the Cerebral Cortex

This section will address each of the four lobes of the cerebral cortex and discuss their unique and overlapping functional properties. It will become apparent, that discussion of the various lobes of the cerebral cortex is a matter of convenience, revealing that all forms of behavior are a product of interactions between different regions of the brain. This is the basis of 'systems neuroscience.'

Specific behavioral topics that will be covered in this section will include: Disorders of sensation and perception; epilepsy; hallucinations; phantom limbs; impulsivity and response inhibition; planning & judgement; attention; empathy and social perception.

Lecture #	Topic		
9.	Tue	15-June	The Occipital Lobe
10	Wed	16-June	The Occipital Lobe/Parietal Lobe
11	Thur	17-June	Parietal Lobe
12	Mon	21-June	Parietal Lobe/Temporal Lobe

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13	Tue	22-June	Temporal Lobe
14	Wed	23-June	Temporal Lobe/Frontal Lobe
15	Thur	24-June	Frontal Lobe
Exam	Mon	28-June	Exam 2 – 35% (up to and including the Temporal Lobe)

Section III: Special Topics in Neuropsychology

In this section, information gathered about the various functions of the cerebral cortical lobes is integrated in the context of discussing specific topics relevant to cognitive neuroscience and psychiatry

Lecture #	Topic		
16	Tue	29-June	Learning and Memory
17	Wed	30-June	Film: Alzheimer's Dementia
18	Thur	1-July	Dementia
19	Mon	5- July	Attention
20	Tue	6- July	Executive Functions and Schizophrenia
21	Wed	7-July	Hemispheric Specialization
Exam	Thur	8-July	Exam 3 – 40% (from Frontal Lobes to Hemispheric Specialization)