

**EVOLUTION OF THE HUMAN BRAIN (ANTH 3413)
SPRING 2012**

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Class Hours and Location: Monday and Wednesday, 2:20 – 3:35 pm
Hall of Government, 101

Texts:

- (1) Striedter, G.F. (2005) *Principles of Brain Evolution*. Sinauer Associates. **(PBE)**
(2) Allen, J.S. (2009) *The Lives of the Brain: Human Evolution and the Organ of Mind*. Harvard University Press **(LB)**

COURSE SYLLABUS

Course description: In this course, we will examine how the human brain is unique in comparison to other animals, with an emphasis on understanding our species' distinctive neurobiology in relation to the evolution of cognitive abilities such as language, social comprehension, tool making, and abstract thinking. We will survey functional systems in the brain, highlighting current knowledge on phylogenetic variation in connectivity, neocortical diversification, differences in neurotransmitter systems, and evidence from fossil endocasts. The course will also entail discussion of recent theoretical developments in the study of primate neural adaptations and how they relate to socioecological selective pressures. Finally, we will explore how all of these issues intersect in the evolution of the human brain.

Learning objectives: At the end of this course, students will: (1) know the mechanisms of evolutionary change in brain structure and function, (2) be able to identify the features of the mind and brain that are unique to humans and other primates, (3) critically evaluate the various empirical studies and theoretical arguments in the current scientific literature pertaining to human brain evolution, and (4) synthesize this knowledge to develop new questions about the evolution of the human brain.

Course requirements: Your final course grade will be based on the following work:

1. Quiz #1 on neuroanatomy, histology, and neuronal physiology. This quiz is worth **15 points**.
2. Brain, behavior, and evolution news update. Once during each class, a student will present a 5-minute update on a recent research finding concerning brain, behavior, and/or evolution. This assignment is worth **5 points**.
3. Journal club and video discussions. In addition to the textbook reading assignments, each week you will also be responsible to either read one journal article from the primary scientific literature or to watch assigned videos from science TV specials or lectures on the Internet. The assignments will be made available during the prior week on the course's Blackboard site. For the last part of class on Wednesday, we will hold a "journal club" or "video discussion". This will involve small group discussion of the assignment, with an emphasis on critically evaluating the merits and shortcomings of the methods, findings, or interpretations presented. During these weekly discussion sessions, a number of questions will be posed which you will respond to in writing with your small group. Each discussion session is worth 2 points. There will be 10 discussion sessions over the course of the semester, for a total of **20 points**.

4. Quiz #2 on human brain evolution. This quiz is worth **15 points**.
5. Mock grant proposal. As a final written assignment, you will write a mock grant proposal to address a topic of your choice concerning evolution of the brain or behavior. This written assignment is worth **35 points** of your final grade. The proposal will be 6 pages, single-spaced and address the following questions (taken from the Leakey Foundation format):
 - a. Concise statement of your research objectives, or the specific questions to be answered.
 - b. Description of the importance of the research project to your specific field and to the study of human origins.
 - c. Brief history of attempts to answer the same or related questions by other researchers.
 - d. Detailed explanation of the information needed to answer the research question(s) and your methods (how you plan to gather this information).
 - e. Summary of any broader implications and your future goals relevant to proposed research.
6. Presentation. During the last two meetings of class, we will hear brief oral presentations of mock research proposals from each student. This oral presentation is worth **10 points** of your final grade.

Readings: In addition to reading relevant sections from the textbooks, copies of journal will be uploaded to Blackboard each week.

SCHEDULE OF TOPICS

(subject to change)

WEEK	TOPIC	READINGS
January 18	Introduction and organization of the course	
January 23	A brief overview of evolutionary history and the brain	PBE, Ch. 1-2
January 25	Anatomy and physiology of neurons	LB, Ch. 1-2
January 30	Conservation in vertebrate brains	PBE, Ch. 3
February 1	Hands-on lab session	
February 6	February 8 - Quiz #1	
February 8	Evolutionary changes in overall brain size	PBE, Ch. 4
February 13	Evolutionary changes in brain region size	PBE, Ch. 5
February 15		
February 20	<i>February 20 - No class - President's Day</i>	
February 22	Laboratory demonstration	Reading TBD
February 27	Evolutionary changes in brain region structure	PBE, Ch. 6-7
February 29	Evolution of neuronal connectivity	
March 5	What's special about mammal brains?	PBE, Ch. 8
March 7		
March 12 - 17	<i>No class - Spring Break</i>	
March 19	What's special about human brains?	PBE, Ch. 9-10; LB, Ch. 3
March 21		
March 26	The functional evolution of the human brain	LB, Ch. 4-5
March 28	The plastic brain	
April 2	The molecular evolution of the human brain	LB, Ch. 6-7
April 4	The evolution of feeding behavior	
April 9	The aging brain	LB, Ch. 8
April 11	Energetics and the brain	
April 16	April 16 - Quiz #2	
April 18	Language and human brain evolution	LB, Ch. 9-10
April 23	Social cognition and human brain evolution	Reading TBD
April 25	Student Presentations	
April 30	Student Presentations	
May 4	Mock Grant Proposal is Due	

Academic integrity: All graded work must be completed in accordance with The George Washington University Code of Academic Integrity, available online: <http://www.gwu.edu/~ntegrity/code.html>

Support for students outside of the classroom:

Disability Support Services (DSS). Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information, please refer to <http://gwired.gwu.edu/dss/>

University Counseling Center (UCC). The Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations; and confidential assessment, counseling services (individual and small group), and referrals. You can reach the UCC at 202-994-5300. For additional information, please refer to <http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices>

Security: In the case of emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After the evacuation, seek shelter at a predetermined rendezvous location.