

**ANBI 140 - Evolution of the Human Brain  
Winter Quarter 2013  
Monday-Wednesday-Friday 3:00-3:50pm  
Warren Lecture Hall 2005**

**Primary Instructor**

Thibaut Bienvenu, Ph.D.

Office: Social Sciences Building, 2nd Floor, Room 287 (Library of Comparative Neuroanatomy)

Office hours: Tuesday 2:00-4:00pm

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**Teaching assistants**

Andrew Somerville

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Discussion sessions (optional): Center Hall, Room 222

Wednesday 5:00-5:50pm

Friday 11:00-11:50am

**Aim of course**

Introduction to the organization of the human brain and evolutionary principles. Overview of the evolution of the human brain through multiple approaches, with a focus on paleoneurology (the study of fossil endocranial casts). The course is built on the latest scientific advances published in refereed journals.

As a common theme, every Friday will be dedicated to presentation and discussion of a topic about the human fossil record.

Moreover, from February 20, every Wednesday will be devoted to a special guest lecturer presenting her cutting-edge research (see class schedule). Attendance to these lectures is mandatory.

**Readings**

The following reading is required:

Allen JS (2009) *The Lives of the Brain. Human Evolution and the Organ of Mind*. Belknap Press of Harvard University Press.

Other required readings are listed below (see class schedule). They are posted on <https://ted.ucsd.edu>.

Students are expected to study the assigned reading before class.

## **Grading**

There will be two exams. The midterm exam will be 40 percent of the final grade, and the final exam 60 percent. The midterm will take place on Wednesday, February 6 and will cover lecture material and readings from 1/7 to 2/1. The final exam will take place during finals week on Wednesday, March 20 at 3:00-6:00pm and will cover lecture material and readings from 2/4 to 3/15. Both exams will include multiple choice questions, definitions, short answers, as well as analyses of visual documents.

## **Examination policy**

Exams will be taken only in the dates/times scheduled. No make-up exams will be considered except in the event of serious illness in which case documentation will be required. To allow any other policy is simply not fair to the great majority of students who do take the exam at the scheduled time. Athletes or students with special needs should contact the professor in the beginning of the quarter to explore if arrangements can be made to accommodate their situation.

## **Class schedule**

### **Week 1: Introduction to human evolution**

Monday, January 7

Introduction and course outline

Wednesday, January 9

Documentary about evolution

Friday, January 11

Reminder of the principles learned in the documentary

Wood B, Harrison T (2011) The evolutionary context of the first hominins. *Nature* 470:347-352.

### **Week 2: Human neuroanatomy**

Monday, January 14

Human neuroanatomy 1

Allen JS (2009) The Lives of the Brain. *Human Evolution and the Organ of Mind*, chapter 2 (pp 6-30).

Wednesday, January 16

Human neuroanatomy 2

Allen JS (2009) The Lives of the Brain. *Human Evolution and the Organ of Mind*, chapter 2 (pp 6-30).

Friday, January 18

Human evolution: the fossil record

Wood B (2010) Reconstructing human evolution: Achievements, challenges, and opportunities. *PNAS* 107:8902-8909.

### **Week 3: Overview of methods in human brain evolution studies**

Monday, January 21  
Martin Luther King Day

Wednesday, January 23  
Diverse approaches and techniques to reconstruct human brain evolution  
Allen JS (2009) The Lives of the Brain. Human Evolution and the Organ of Mind, chapter 2 (pp 30-43).

Friday, January 25  
The brain of australopithecines 1: neural reorganization and the lunate sulcus  
Falk D (2009) The natural endocast of Taung (*Australopithecus africanus*): insights from the unpublished papers of Raymond Arthur Dart. Yearbook of Physical Anthropology 52:49-65.

### **Week 4: Evolution of human brain size within Primates**

Monday, January 28  
Evolution of the brain in Primates  
Barton RA (2006) Primate brain evolution: integrating comparative, neurophysiological, and ethological data. Evolutionary Anthropology 15:224-236.

Wednesday, January 30  
Evolution of brain size 1  
Allen JS (2009) The Lives of the Brain. Human Evolution and the Organ of Mind, chapter 3 (pp 44-81).

Friday, February 1  
The brain of australopithecines 2: the frontal lobes  
Falk D, et al. (2000) Early hominid brain evolution: a new look at old endocasts. Journal of Human Evolution 38:695-717.

### **Week 5: Midterm's week**

Monday, February 4  
Evolution of brain size 2: energetics and diet  
Allen JS (2009) The Lives of the Brain. Human Evolution and the Organ of Mind, chapter 7 (pp 177-201).

Wednesday, February 6  
Midterm exam

Friday, February 8  
The emergence of genus *Homo*  
Carlson KJ, et al. (2011) The endocast of MH1, *Australopithecus sediba*. Science 333:1402-1407.

## **Week 6: Evolution of the brain connectivity**

Monday, February 11

Evolution of the cerebellum

Weaver AH (2005) Reciprocal evolution of the cerebellum and neocortex in fossil humans. PNAS 102:3576-3580.

Wednesday, February 13

Hemispheric specialization

Balzeau A, Gilissen E, and Grimaud-Hervé D (2012) Shared pattern of endocranial shape asymmetries among great apes, anatomically modern humans, and fossil hominins. Plos One 7:e29581

Friday, February 15

The first human out of Africa: *Homo erectus s.l.*

Grimaud Hervé D, Lordkipanidze D (2010) The fossil hominids' brain of Dmanisi: D 2280 and D 2282. pp 59-81 in The Human Brain Evolving (editors Broadfield D, Yuan M, Schick K, and Toth N).

## **Week 7: Evolution at the cellular level**

Monday, February 18

Presidents Day

Wednesday, February 20

Lecture: Katerina Semendeferi, Pr.

Semendeferi K, et al. (2011) Spatial organization of neurons in the frontal pole sets humans apart from great apes. Cerebral Cortex 21:1485-1497.

Friday, February 22

Insular evolution: *Homo floresiensis*

Falk D, et al. (2005) The brain of LB1, *Homo floresiensis*. Science 308:242-245.

## **Week 8: Evolution of cognition and emotions**

Monday, February 25

Evolution of the frontal lobes

Allen JS (2009) The Lives of the Brain. Human Evolution and the Organ of Mind, chapter 7 (pp 99-109).

Wednesday, February 27

Lecture: Lisa Stefanacci, Ph.D.

Barger N, et al. (2012) Neuronal populations in the basolateral nuclei of the amygdala are differentially increased in humans compared with apes: A stereological study. Journal of Comparative Neurology 520:3035-3054.

Friday, March 1

Another face of humanity: *Homo neanderthalensis*

Bruner E, Manzi G (2008) Paleoneurology of an “early” Neandertal: endocranial size, shape, and features of Saccopastore 1. *Journal of Human Evolution* 54:729-742.

### **Week 9: Evolution of language**

Monday, March 4

Evolution of language

Allen JS (2009) *The Lives of the Brain. Human Evolution and the Organ of Mind*, chapter 9 (pp 232-272).

Wednesday, March 6

Lecture: Kari Hanson

Friday, March 8

The fossil evidence of brain evolution in our own species, *Homo sapiens*

Kubo D, Kono RT, and Suwa G (2011) A micro-CT based study of the endocranial morphology of the Minatogawa I cranium. *Anthropological Science* 119:123-135.

### **Week 10: Evolution of the human brain growth and development**

Monday, March 11

The evolution of human brain ontogeny

Zollikofer CPE, Ponce de León MS (2010) The evolution of hominin ontogenies. *Seminars in Cell & Developmental Biology* 21:441-452.

Wednesday, March 13

Lecture: Branka Hrvoj

Friday, March 15

Summary and conclusion

### **Week 11: Finals week**

Wednesday, March 20

3:00-6:00pm

Final exam