

ANBI 140: Evolution of the Human Brain**Instructor:****Dr. Caroline Lew**

Office: Social Sciences Building Room 287

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Office Hours: Monday 2-3:30pm or by appointment

Lectures: MWF 1-1:50p, Humanities and Social Sciences Building Room 2321.

Lectures will not be podcasted, so please attend class!

Aim of Course: To explore the “uniqueness” of the human brain, utilizing multiple levels of analysis, within the context of our primate ancestry. Particular emphasis will be paid to the neural underpinnings of cognition/behaviors attributed to be unique in humans.**Required Readings:** Students are required to complete assigned readings prior to lecture.1) John Allen The Lives of the Brain. Human Evolution and the Organ of the Mind. Harvard University Press, 2009.I will post select chapters to the course website. Also available electronically to read online on JSTOR: <http://www.jstor.org/stable/j.ctt13x0f1c>

2) Selected readings listed in syllabus. These will be posted to the course website.

Grading:*Midterm (5/07, in class): 35%**Reading presentations: 20%**Presentation day attendance/participation: 5%**Cumulative Final (6/14, 11:30-2:30): 40%***Exams:** Exams will be a mixture of multiple choice, true and false, fill in the blank, matching, and short answer questions. You will only be tested on material covered in lecture.**Reading presentations:** Each student will make an oral presentation of a selected reading during the quarter. Readings for student presentations are denoted with an asterisk (*) in the schedule. The presentation will include a detailed review and critique of the assigned reading. Three to four ten-minute student presentations will be scheduled per week, starting week 3. Two students will be assigned to a few longer selected readings.**Attendance and participation** is mandatory (5% of grade) for all students on presentation days.

Academic Integrity: The office of Academic Integrity provides guidance for students and faculty (<https://students.ucsd.edu/academics/academic-integrity/index.html>). A basic rule of thumb for this course is to avoid plagiarism and use no aids during examinations (i.e. notes, your neighbor's exam, your cell phone, etc).

Students with Disabilities: I will gladly make accommodations for students with documented disabilities. Please let me know at the beginning of the term if you will require anything.

Student Athletes: Please let me know as soon as possible if you have conflicts, and provide documentation.

Make-up exam policy: Exams will be issued only on the dates/times scheduled. No make-up exams will be allowed except in the case of serious illness or family emergency/death, in which case official documentation is required.

Presentation policy: Students will be assigned presentation days during the first class meeting. Last minute cancellation of any scheduled presentation will not be accepted.

***Syllabus/readings subject to change**

Date	Topic	Reading
4/02	<i>Course Overview, oral presentation assignments</i>	
4/04	<i>Basic organization of the primate brain- gross structure</i>	Purves et al. (2001) The organization of the nervous system In: <u>Neuroscience</u> (Purves,D. et al. editors), Sunderland, Mass 2nd Edition. pp. 20-31.
4/06	<i>Basic organization of the primate brain- microstructure</i>	Fields, D. (2009) <u>The Other Brain</u> , New York: Simon and Schuster. Ch 1-2.
	Week 2	
4/09	<i>Major structures of the primate brain</i>	Allen Ch. 2
4/11	<i>Major structures cont.,</i>	
4/13	<i>Evolutionary principles; Methods of evolutionary neuroscience</i>	
	Week 3	
4/16	<i>Evolution of brain size</i>	Allen: Ch 3 * Isler K, van Schaik CP (2009) The Expensive Brain: A framework for explaining evolutionary changes in brain size. J Hum Evol 57:392–400. *Du A, Zipkin AM, Hatala KG, Renner E, Baker JL, Bianchi S, Bernal KH, Wood BA (2018) Pattern and process in hominin brain size evolution are scale-dependent. Proc R Soc B Biol Sci 285:20172738 .

		*John Hawk blog post response to Du: http://johnhawks.net/weblog/reviews/brain/brain-size-gradual-naledi-left-out-2018.html
4/18	<i>Evolution of brain size cont.- brain regions</i>	Striedter, G.F. (2005) <i>Principles of Brain Evolution</i> , Sinauer Associates, Sunderland, Massachusetts, Chapter 5 “Evolutionary Changes in Brain Region Size”, pp 137-176. *Semendeferi K, Armstrong E, Schleicher a, Zilles K, Van Hoesen GW (2001) Prefrontal cortex in humans and apes: a comparative study of area 10. <i>Am J Phys Anthropol</i> 114:224–241
4/20	<i>Student presentations</i>	
	Week 4	
4/23	<i>Primate brain evolution</i>	*Barton RA (2006) Primate brain evolution: integrating comparative, neurophysiological, and ethological data. <i>Evolutionary Anthropology</i> 15:224-236. *Smaers JB, Soligo C (2013) Brain reorganization, not relative brain size, primarily characterizes anthropoid brain evolution. <i>Proc Biol Sci</i> 280.
4/25	<i>Human brain evolution – gross structure</i>	*Rilling JK (2006) Human and nonhuman primate brains: are they allometrically scaled versions of the same design? <i>Evolutionary Anthropology</i> 15: 65–77. *Herculano-Houzel, S. (2009). The human brain in numbers: a linearly scaled-up primate brain. <i>Frontiers in human neuroscience</i> , 3
4/27	<i>Student presentations</i>	.
	Week 5	
4/30	<i>Human Brain Evolution - Association Cortex</i>	Allen: Ch 4 “The Frontal Lobes” *Spocter M a, Hopkins WD, Barks SK, Bianchi S, Hehmeyer AE, Anderson SM, Stimpson CD, Fobbs AJ, Hof PR, Sherwood CC (2012) Neuropil distribution in the cerebral cortex differs between humans and chimpanzees. <i>J Comp Neurol</i> 520:2917–2929. *Semendeferi, K., K.Teffe, D.P. Buxhoeveden, M.S. Park, S. Bludau, K. Amunts, K.Travis, J. Buckwalter (2011) Spatial organization of neurons in the prefrontal cortex sets humans apart from great apes. <i>Cerebral Cortex</i> , 21:1485—1497.
5/02	<i>Human Brain Evolution - Subcortical Structures</i>	Allen: Ch 2., 28-30 Ch 4, “Limbic Reorganization” *Barger N, Hanson KL, Teffer K, Schenker-Ahmed NM, Semendeferi K (2014) Evidence for evolutionary specialization in human limbic structures. <i>Front Hum Neurosci</i> 8:1–17.

5/04	<i>Student presentations</i>	
	Week 6	
5/07	MIDTERM	
5/09	<i>Human Brain Evolution – Cellular Specializations</i>	<p>*Allman JM, Tetreault NA, Hakeem AY, Park S (2011) The von economo neurons in apes and humans. <i>Am J Hum Biol</i> 23:5–21.</p> <p>*Sherwood, C. C., et al. (2012) Human brain evolution writ large and small In: M. A. Hofman and D. Falk (Eds.) <i>Progress in Brain Research</i>, Vol. 195</p> <p>*Hanson KL, Hrvovj-Mihic B, Semendeferi K (2014) A Dual Comparative Approach: Integrating Lines of Evidence from Human Evolutionary Neuroanatomy and Neurodevelopmental Disorders. <i>Brain Behav Evol</i> 84:135–155</p>
5/11	<i>Human Brain Evolution- neurotransmitter systems</i>	Guest lecturer Dr. Kari Hanson
	Week 7	
5/14	<i>The limbic system; social brain networks</i>	<p>*Lew CH, Semendeferi K (2017) Evolutionary Specializations of the Human Limbic System. In: <i>Evolution of Nervous Systems</i>, 2e (Kaas J, ed), pp 277–291. Elsevier</p> <p>*Kennedy DP, Adolphs R (2012) The social brain in psychiatric and neurological disorders. <i>Trends Cogn Sci</i> 16:559–572.</p>
5/16	<i>Evolution of the social brain</i>	*Shultz, S., & Dunbar, R. I. (2012). Social cognition and cortical function: an evolutionary perspective. <i>Action, perception and the brain: adaptation and cephalic expression</i> .
5/18	<i>Student presentations (week 6 readings)</i>	
	Week 8	
5/21	<i>Evolution of the social brain cont.; Evolution of Language Networks</i>	<p>Allan Ch. 9</p> <p>*Decety J (2011) The neuroevolution of empathy. <i>Ann N Y Acad Sci</i> 1231:35–45 .</p> <p>*Schenker NM, Hopkins WD, Spocter M a, Garrison AR, Stimpson CD, Erwin JM, Hof PR, Sherwood CC (2010) Broca's area homologue in chimpanzees (<i>Pan troglodytes</i>): probabilistic mapping, asymmetry, and comparison to humans. <i>Cereb Cortex</i> 20:730–742.</p> <p>*Aboitiz F, Garcia R (1997) The evolutionary origin of the language areas in the human brain. A neuroanatomical perspective. <i>Brain Res Rev</i> 25:381–396.</p>
5/23	<i>Brain evolution and diet</i>	Allen Ch. 7
5/25	<i>Student presentations (Week 7 readings)</i>	
	Week 9	

5/28	<i>Memorial Day</i>	
5/30	<i>Developmental specialization- neuronal development, postnatal</i>	Guest lecturer Branka Hrvoj-Mihic; reading TBA
6/01	<i>Student presentations (Week 8 and 9 readings)</i>	
	Week 10	
6/04	<i>Developmental Specialization- what iPSCs can tell us about human neuronal development</i>	Guest lecturer Dr. Carol Marchetto, Salk Institute; readings TBA
6/06	<i>Course wrap-up</i>	<p>*Gómez-Robles A, Hopkins WD, Sherwood CC (2013) Increased morphological asymmetry, evolvability and plasticity in human brain evolution. <i>Proc R Soc B Biol Sci</i> 280:20130575</p> <p>*C.C. Sherwood, F. Subiaul, and T.W. Zawidzki (2008) A natural history of the human mind: tracing evolutionary changes in brain & cognition. <i>Journal of Anatomy</i> 212: 426-454.7</p>
6/08	<i>Student presentations</i>	