PRIMATE ANATOMY

ANT 432L Unique# 31780
Fall 2018/Shapiro

COURSE WEBSITE (via Canvas): canvas.utexas.edu

Instructor: Liza Shapiro

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***If you can't come to my office during office hours, please feel free to make an appointment! You are also welcome to communicate with me by email.**

Prerequisites: ANT 301 *or* Human biology major *or* consent of instructor.

Required Texts:
Gebo, D (2014) Primate Comparative Anatomy. Johns Hopkins University Press.

Whitehead P, Sacco W, and Hochgraf S (2005) A Photographic Atlas for Physical Anthropology. Morton Publishing Company.

The textbooks are available at the University Co-Op. If you don't want to purchase them, **both books are also on reserve in the Life Sciences Library (2nd floor, Main Building).**

Other required readings:

1. Readings online: In addition to the textbook readings, there are numerous other assigned readings that are available in pdf format via the course website on Canvas (**canvas.utexas.edu)**. These readings are *required*. Once you log-in to the course via Canvas, you will find these readings by clicking on the links for the appropriate dates visible on the Home page.

2. Lab readings and assignments: You can find lab readings and assignment sheets on Canvas by clicking on the appropriate lab date on the Home page. Read the assignment before coming to lab, and download and print the lab assignment sheet. **You MUST bring your lab readings and assignment sheets to lab *EVERY WEEK*.**

Course description and objectives:

This course is an exploration of the relationship between primate anatomical form and function from an evolutionary perspective. The course is designed to demonstrate how the primate body form is adapted to its many functions, with an emphasis on adaptations to diet and

locomotion. There will be lectures as well as a separate laboratory section. The lab will not include dissection, but will emphasize the diversity and function of the primate skeleton and give you a chance to learn anatomy "hands-on".

After taking the course, you should:

1) have a good grasp of basic primate anatomy - e.g. be able to identify the bones that comprise the skeleton, and to understand the arrangement of the basic muscle groups described in class;

2) understand the various methodological approaches one can use to elucidate the relationship between morphology and function;

3) be able to provide functional explanations for some of the basic anatomical differences among primates;

4) understand how the study of functional morphology in living primates can be applied to the reconstruction of behavior in fossil primates.

Grading : Grades are based on the following:

1. Midterm 20%
2. Final 20%
3. Lab Midterm 10%
4. Lab Final 20%
5. Term Paper 15% (Topic due Nov 13, Paper due Dec 10)
6. Lab assignments 10%
7. Participation 5% (I expect you to be able to demonstrate your understanding of the reading material by responding to questions I might ask in class, or simply by asking relevant questions yourself. Participation also consists of being “engaged” during lab, e.g. when working with others, contributing to group discussions , asking questions, etc).

Final course letter grades will be assigned using the +/- grading system. Decimal places of 0.5 or above will be rounded up. (e.g. ≥89.5=90=A-)

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93-100	**90 to <93**	**87 to <90**	**83 to <87**	**80 to <83**	**77 to <80**	**73 to <77**	**70 to <73**	**67 to <70**	**63 to <67**	**60 to <63**	**<60**

Lab grades: Each lab includes a weekly assignment to hand in. You will be graded on the weekly lab assignments, and you will be tested on the lab material twice during the semester. There will be a lab midterm, covering only the 3 labs on the human skeleton. At the end of the semester, there will also be a lab final that covers the remaining lab material. Both the lab midterm and the lab final will be in the form of a lab practical. The percentages of your final grade for each of these components of lab are listed above.

Midterm: The midterm is 20% of your final grade and will consist of multiple choice questions and short answers, and short or longer essays. The material you are responsible for comes from the lectures, the readings, and the labs.

Final: The final (20% of your grade) is not cumulative and also includes material from the lectures, the readings, and the labs. Format is similar to the midterm.

Term Paper : Each student will be required to write a term paper 10-15 pages long (double-spaced, 12 pt font, 1 inch margins.). The paper is worth 15% of your final grade. Details about the content of the term paper are on the Canvas website (see Term Paper link on the Home page).

Submit paper topic or outline to me by Nov 13 no later than 5 p.m. (via Canvas)
Submit paper (via Canvas) by Dec 10 at 5 pm.

In conjunction with the paper, you are required to read a tutorial on plagiarism and take a short quiz on it. The tutorial can be found at
http://www.lib.utexas.edu/services/instruction/learningmodules/plagiarism/.
The plagiarism test is available on Canvas under "Quizzes".
Your term paper will not be graded unless you complete the plagiarism quiz. Take the quiz anytime but no later than Dec 10

Manage your time wisely when preparing to write the paper. This may help (even though you're not "dummies"!):
http://www.dummies.com/how-to/content/budgeting-your-time-to-complete-a-research-paper.html

Course policies:

The following policies are not intended to be harsh, but are included to provide clear guidelines on issues that students often face throughout the semester.

Expectations

I expect you to do the assigned readings in advance of the lectures and to come to class each day on time. During class, you may use your laptop or other device for note taking but not for checking email, doing homework from other classes, surfing the web, etc. For lab, I expect you to come prepared with your assignment sheet in hand (from Canvas). If you forget to bring the assignment sheet, you will have to leave class and print it out on campus, which means you will lose precious lab time.

Attendance:

I do not take formal attendance, but I am aware of who consistently comes to class and who doesn't. Consistent attendance can help boost your grade if you end up with a borderline final grade. Whether you come to class or not, you are responsible for keeping up with what happens in class. This applies to the content of the class, handouts, and announcements about class policies, events, deadlines, etc. Lectures and announcements can be found on Canvas, but it is easy to miss other pertinent information if you are absent from class.

Guns.

As of August 1, 2016, due to the passage of S.B. 11 (https://campuscarry.utexas.edu), licensed, concealed handguns are now allowed in most campus buildings, including classrooms. If you hold a license to carry a concealed weapon, it is your responsibility to know and follow the Texas and University policies listed here: https://campuscarry.utexas.edu/students. Visible weapons or threatening behavior will be reported to the UT Police Department immediately.

The following statement serves as a reminder - I am required to notify you of this *verbally*, and I will do so in class:

Based on my legal right to ban guns from my UT office, ***no guns are allowed in my office*** **(SAC 5.128)**. Leaving a gun unattended (as it would be, if left outside my office) is against the law. Please plan accordingly. ***YOU*** are always welcome in my office, just not your gun. Thank you.

Make-ups

There will be no make-up exams or labs. Exceptions will be made only 1) with *proof* of dire emergency or illness, 2) due to observance of a religious holy day, or 3) due to military service. I will not provide alternative exam times for students who have personal travel plans or commitments, so please don't ask.

- Illness or emergency: If you miss an exam or lab due to illness or emergency, contact me *as soon as possible* either before the exam or within 2 days after the exam or lab. You will not be given a make-up unless you can provide documentation regarding the reason for your absence.

- Religious holy days. By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

- Absence for military service. In accordance with section 51.9111 of the Texas Education Code, a student is excused from attending classes or engaging in other required activities, including exams, if he or she is called to active military service of a reasonably brief duration. [The maximum time for which the student may be excused has been defined by the Texas Higher Education Coordinating Board as "no more than 25 percent of the total number of class meetings or the contact hour equivalent (not including the final examination period) for the specific course or courses in which the student is currently enrolled at the beginning of the period of active military service."] The student will be allowed a reasonable time after the absence to complete assignments and take exams.

Students with disabilities: Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities at ssd@austin.utexas.edu , 471-6259 (voice), 410-6644 (video phone) or http://ddce.utexas.edu/disability/. ***Please inform me as soon as possible if you need accommodations.***

Late assignments

Late assignments will cost you 10 points (out of 100) per day. This could change your grade dramatically. Don't be late!

Grades

The grade you are given, either on an individual exam or assignment or as your final grade, is not the starting point of a negotiation. It is your grade unless an error has been made. If you think an error has been made, let me know within one week of receiving the assignment or exam grade.

Extra Credit:

I do not offer "extra credit" opportunities. If you are struggling in the course, please come for help *during* the semester when there is still time for me to help you. Take advantage of office hours or make an appointment with me or the TA . Do not wait until the course is over and ask me to change your grade because you are trying to graduate, or you have had a tough time with your personal life this semester. By then, it is too late for me to help you.

Honor Code: Each student in this course is expected to abide by the University of Texas Honor Code.:

The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Scholastic Dishonesty

Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from The University. Scholastic dishonesty" includes, but is not limited to, cheating, plagiarism, collusion,

falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor), or the attempt to commit such an act.

See http://deanofstudents.utexas.edu/sjs/scholdis.php

For a tutorial and information on plagiarism, see
http://www.lib.utexas.edu/services/instruction/learningmodules/plagiarism/

Special note on use of social media: If students create a Facebook page (or use other social media) to communicate about the course, Dr. Shapiro and the teaching assistant must be provided access. Communication about content/answers to lab assignments, or course exams (whether verbally or via electronic communications) will be considered cheating and students involved will be subject to disciplinary action .

Emergency evacuation: (Office of Campus Safety and Security, 512-471-5767, http://www.utexas.edu/safety/)

- Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.

- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.

- Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class.

- In the event of an evacuation, follow the instruction of faculty or class instructors.

- Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.

Other useful information:

Resources for Learning & Life at UT Austin The University of Texas has numerous resources for students to provide assistance and support for your learning.

- Sanger Learning and Career Center: **https://ugs.utexas.edu/slc**
- University Writing Center: **http://uwc.utexas.edu/**

- Counseling & Mental Health Center: **http://cmhc.utexas.edu/**
- Career Counseling: **http://ugs.utexas.edu/vick/career**
- Student Emergency Services: **http://deanofstudents.utexas.edu/emergency/**

Behavior Concerns Advice Line (BCAL)

- If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individual's behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit **http://www.utexas.edu/safety/bcal**

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LECTURE SCHEDULE

Aug	30	Introduction
Sept	4	The primate musculoskeletal system
	6	Primate diversity
	11	Adaptation, natural selection, and functional morphology
	13	The evolutionary origin of primate features
	18	Functional morphology: methods
	20	Muscles and lever systems
	25	Primate Locomotion
	27	Primate quadrupedal gait
Oct	2	Bone Biomechanics
	4	Body size and primate adaptations
	9	Review for midterm
	11	*** MIDTERM ***
	16	Functional morphology of the dentition
	18	Movie: Life of Mammals (strepsirrhines and monkeys)
	23	Functional morphology of the forelimb I (pectoral girdle, arm, forearm)
	25	Functional morphology of the forelimb II (wrist, hands)
	30	Functional morphology of the vertebral column
Nov	1	…vertebral column continued…

	6	Cranial morphology and locomotion
	8	Kinematics of bipedalism
	13	Functional morphology of the hind limb I (pelvis, thigh, leg) **(Paper topic due today via Canvas by 5 p.m.)**
	15	Functional morphology of the hind limb II (ankle, foot)
	20	Movie: Life of Mammals (apes)
	22	**THANKSGIVING**
	27	Reconstruction of locomotor behavior in fossils: *Australopithecus afarensis* and the evolution of bipedalism
	29	**Lab 12: Locomotor anatomy of *Australopithecus afarensis***
Dec	4	Review for lab final
	6	Final exam

TERM PAPER DUE Dec 10 by 5 p.m.

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LAB SCHEDULE

Sept	4	LAB 1: Shoulder and Forelimb: Osteology
	11	LAB 2: Pelvis and Hind limb: Osteology
	18	LAB 3: Skull, Vertebral Column and Thorax: Osteology
	25	Lab Midterm (on human osteology only)
Oct	2	LAB 4: Muscles and Lever Systems
	9	LAB 5: Primate quadrupedal gait
	16	Lecture instead of lab: Functional morphology of the jaw
	23	LAB 6: Primate Teeth and Jaws
	30	LAB 7: The Primate Forelimb
Nov	6	LAB 8: Primate Vertebral Column and Thorax
	13	LAB 9: Back muscle function during locomotion
	20	Lab 10 Kinematics of bipedalism
	27	**LAB 11: Primate Pelvis and Hind limb**

(Lab 12 will be held during class time on Thursday Nov 29)

Dec	4	Lab final

ANT432L: PRIMATE ANATOMY Fall 2018 LIZA SHAPIRO

READING ASSIGNMENTS

Note: Readings below include the two textbooks (Gebo, and Whitehead et al.) as well as other readings beyond the textbooks. The Whitehead book is on reserve in the Life Sciences Library in case you don't want to purchase it. All non-textbook readings are available online via the course website (Go to Canvas at canvas.utexas.edu)

Aug 30: Introduction to the course (no reading)

Sept 4: THE PRIMATE MUSCULOSKELETAL SYSTEM

1. Fleagle, J Chapter 2 from *Primate Adaptation and Evolution*. Academic Press.

2. Whitehead et al. (Textbook) Chapter 2

and see https://www.youtube.com/watch?v=5YcNAPzDxDg

Sept 6: PRIMATE DIVERSITY

1. Whitehead et al. (Textbook) Chapter 1

2. Gebo (Textbook): Chapters 2 and 3

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Sept 11: ADAPTATION, NATURAL SELECTION, AND FUNCTIONAL MORPHOLOGY

1. History of the study of form and function:
http://www.ucmp.berkeley.edu/history/aristotle.html
http://www.ucmp.berkeley.edu/history/hilaire.html
http://www.ucmp.berkeley.edu/history/cuvier.html

2. Gould, S.J. and R.C. Lewontin (1979). The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme. Proc. R. Soc. Lond. B 205:581-598.

Optional (if you need the review):
http://evolution.berkeley.edu/evolibrary/article/evo_14

Sept 13: THE EVOLUTIONARY ORIGIN OF PRIMATE FEATURES

1. Cartmill, M (1992) New views on primate origins. Evolutionary Anthropology 105-111.

Sept 18: FUNCTIONAL MORPHOLOGY: METHODOLOGICAL APPROACHES

1. Fleagle J (1979) Primate positional behavior and anatomy: naturalistic and experimental approaches. In M Morbeck, H Preuschoft, N Gomberg (eds.): Environment, Behavior and Morphology: Dynamic Interactions in Primates, New York:Gustav Fischer, pp. 313-325.

2. Thomas R (1979) Constructional Morphology. In: Fairbridge R and D Jablonski (eds): Encyclopedia of Paleontology. Dowden, Hutchinson and Ross, pp. 482-487.

Sept 20: MUSCLES AND LEVER SYSTEMS

1. "Levers and other simple machines: PAGES 193-198 in: Jensen C, Schultz G, and Bangerter B (1983) Applied Kinesiology and Biomechanics, McGraw-Hill.

2. Gebo textbook: pages 47-54

Sept 25: PRIMATE LOCOMOTION

1. McCabe, S. 2017. Arboreal locomotion. The International Encyclopedia of Primatology. A. Fuentes, Ed. John Wiley and Sons.

2. pages 477-483 ("Classification of primate locomotion") from Martin, R.D. (1990) Primate Origins and Evolution, Princeton University Press.

Optional:
Fleagle, J (1984) Primate locomotion and diet. In D Chivers, B Wood, and A Bilsborough (eds.): Food Acquisition and Processing in Primates, Plenum Press, pp. 105-117.

Sept 27: PRIMATE QUADRUPEDAL GAIT

1. Cartmill,et al. (2007). "Primate gaits and primate origins." In *Primate origins: Adaptations and evolution*. Springer US, 2007. 403-435.

2. Shapiro L, and Raichlen D. (2005) Lateral sequence walking in infant *Papio*

cynocephalus: Implications for the evolution of diagonal sequence walking in primates. American Journal of Physical Anthropology. 126:205-213.

(and see lab reading for Gait lab (Lab 5), posted on page for Oct 9)

Oct 2: BONE BIOMECHANICS

1. Gebo textbook 45-47

2. Read pages 5-12, and look over pages 22-30 in Swartz, S. (1993) Biomechanics of primate limbs, in Gebo, D. (Ed) Postcranial adaptation in Nonhuman Primates. Northern Illinois University Press.

Oct 4: BODY SIZE AND PRIMATE ADAPTATIONS

1. Gebo textbook: pages 54-55

2. Fleagle J (1985) Size and adaptation in primates. In W Jungers (ed): Size and Scaling in Primate Biology, pp. 1-19., Plenum Press.

3. pages 19-21 in Swartz, S. (1993) Biomechanics of primate limbs, in Gebo, D. (Ed) Postcranial adaptation in Nonhuman Primates. Northern Illinois University Press.

Oct 9: Read study guide for midterm exam.

********** Oct 11: MIDTERM****************

Oct 16: FUNCTIONAL MORPHOLOGY OF THE DENTITION AND JAW

1. .Ungar P and Lucas, P (2010) Tooth form and function in biological anthropology. Chapter 29 (pgs 516-529) in Larsen, Clark Spencer, ed. *A Companion to Biological Anthropology*. Vol. 20. John Wiley & Sons, 2010.

2. Whitehead et al. Textbook: Use photos in Chapter 3 to aid you in your reading.

3. Gebo textbook: pages 80-82

4. Hylander, W (1979) The functional significance of primate mandibular form. J. Morph. 160:223-240.)

October 18. No reading.

Oct 23: FUNCTIONAL MORPHOLOGY OF THE FORELIMB 1 (pectoral girdle, arm, forearm)

1. Whitehead et al. Textbook: pages 167-177 (Appendicular Skeleton)

2. Gebo textbook: pages 119-133, plus 170-171

Oct 25: FORELIMB 2 (HANDS)

1. Whitehead et al. textbook: pages 178-181 (Hand and Wrist)

2. Gebo textbook: pages 133-137

3. Martin, R.D. (1990), pages 496-499 (The hands) from Primate Origins and Evolution, Princeton.

4. Napier, J (1993) Hands (revised edition edited by R Tuttle; originally published 1980). Chapter 3: Function of the Hand

Oct 30 and Nov 1: VERTEBRAL COLUMN

1. Whitehead et al. textbook: pages 156-166 (Axial Skeleton)

2. Shapiro, L. Functional morphology of the vertebral column in primates. In Gebo, D. (Ed) Postcranial adaptation in Nonhuman Primates. Northern Illinois University. Pages 121-149

Nov 6: Cranial morphology, posture and locomotion

1. Russo, Gabrielle A., and E. Christopher Kirk. "Foramen magnum position in bipedal mammals." *Journal of human evolution* 65.5 (2013): 656-670.

Nov 8: KINEMATICS OF BIPEDALISM

1. pp.268-272 in Aiello L, and Dean C (1990) Human Evolutionary Anatomy, Academic Press. “Bipedal locomotion in humans and apes”

2. pp. 102-105 in Whittle, M (1996) Gait Analysis: An Introduction. Oxford: Butterworth-Heinemann. “Gait in the young”.

Nov 13: HINDLIMB 1 (PELVIS, THIGH, LEG) (Paper topic due today at 11:00 a.m.

1. Whitehead et al. textbook: pages 181-191

2. Gebo textbook: 141-156, plus 171-181

3. Pages 332-337 in Conroy G (1990) Primate Evolution. New York: WW Norton on "Biomechanical principles of bipedalism".

4. Pages 244-248 in Aiello L, and Dean C (1990) Human Evolutionary Anatomy, Academic Press. "Bipedal locomotion and the postcranial skeleton".

Nov 15: HINDLIMB 2 (ANKLE, FOOT)

1. Whitehead et al. textbook pages 192-198

2. Gebo textbook:156-161

3. Pages 88-92 in Schultz, A (1969) The Life of Primates , Universe Books.

4. Susman, R (1983) Evolution of the human foot: evidence from Plio-Pleistocene Hominids. Foot and Ankle 3:365-376.

Nov 20: No reading

Nov 22: Thanksgiving

Nov 27: RECONSTRUCTION OF LOCOMOTOR BEHAVIOR IN FOSSILS: AUSTRALOPITHECUS AFARENSIS AND THE EVOLUTION OF BIPEDALISM

1. Susman R, Stern J, and Jungers W (1985) Locomotor adaptations in the Hadar hominids. In: Ancestors:The Hard Evidence, Alan R. Liss, Inc. pp. 184-192.

2. Lovejoy, CO (1988) Evolution of human walking. Scientific American, November, pp.118-125.

Nov 29: LAB DURING CLASS TIME. (Lab 12: Locomotor anatomy of *Australopithecus afarensis*)

Dec 4: 11:00-12:30 Class review time for lab final (Lab final at 2 pm)

Read Whitehead et al. textbook pages 199-204 for summary of postcranial comparative anatomy

Dec 6: Final exam

TERM PAPER DUE Dec 10 by 5 p.m.

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