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Course Outline for ANTH 1L
BIOLOGICAL/PHYSICAL ANTHRO LAB
Effective: Fall 2009

I. CATALOG DESCRIPTION:

ANTH 1L — BIOLOGICAL/PHYSICAL ANTHRO LAB — 1.00 units

Laboratory exercises developed as an adjunct to Anthropology 1 (Introduction to Biological/Physical Anthropology) including the identification of fossils through examination of fossil casts, the study of human artifacts, observation of primate behavior and structure, and problem solving in case studies of human genetics. Prerequisite: Anthropology 1 (may be taken concurrently). 3 hours laboratory.

1.00 Units Lab

Prerequisite

ANTR 1 - Biological/Physical Anthropology

Grading Methods:

Optional

Discipline:

	MIN
Lab Hours:	54.00
Total Hours:	54.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT:

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. ANTR1

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

1. understand and apply the scientific method
2. explain the processes of evolution
3. describe the structure and functions of DNA
4. explain how mutation, natural selection, gene flow and genetic drift drive the evolutionary process
5. explain the causes of superficial human variation
6. explain how genetic traits are inherited
7. predict the statistical probabilities for genetic outcomes
8. identify the bones of the human body
9. determine the age, sex, and continental ancestry of a skeleton
10. describe the dentition and post-cranial anatomy of primates
11. explain the relationship between bipedal locomotion and cranial/post-cranial morphology
12. enumerate the types and features of mammals and primates
13. discuss the behavior of captive primates
14. describe the morphology of early hominids
15. describe the morphology of early Homo
16. identify the defining features of anatomically modern Homo sapiens sapiens

V. CONTENT:

- A. The science of physical anthropology
 1. the scientific method
 2. evolutionary theory as science
 3. evolution and human ancestry
- B. Cell biology
 1. cells and organelles
 2. cell division (mitosis and meiosis)
 3. chromosomes
- C. Molecular genetics
 1. DNA and RNA
 2. Complimentary bases
 3. replication

4. protein synthesis
 - a. transcription
 - b. translation
5. mutations
6. chromosomal "crossing-over"
7. chromosomal abnormalities
 - a. monosomy
 - b. trisomy
- D. Mendelian genetics
 1. the study of inheritance
 2. Mendelian, polygenic, and pleiotropic traits
 3. dominant and recessive alleles
 4. incomplete dominance and co-dominance
 5. Punnett squares
 6. autosomal traits
 7. sex-linked traits
 8. the ABO blood system
- E. Evolutionary forces
 1. natural selection
 2. mutation
 3. genetic drift
 4. gene flow
 5. phyletic gradualism
 6. punctuated equilibrium
 7. population genetics
- F. Human osteology
 1. functions of the skeleton
 2. what bones reveal
 - a. age
 - b. sex
 - c. continent of ancestral origin
 - d. physical activity
 - e. disease
 - f. diet
 3. the bipedal adaptation
 4. classification, development, and anatomy of bone
 5. anatomical terminology
 6. the skull
 7. dentition
 8. the vertebral column
 9. the thorax
 10. the appendicular skeleton
- G. Forensic anthropology
 1. human variation
 2. anthropometry
 3. sexing the skeleton
 4. aging the skeleton
 5. determining ancestry
 6. determining stature
 7. comparative osteology
- H. The living primates
 1. types of mammals
 2. mammalian traits
 3. types of primates, distribution and habitats
 4. primate functional morphology
 - a. locomotion
 - b. diet and dentition
 5. classification schemes
 6. homologous and analogous features
 7. primitive and derived features
 8. behavioral observation of captive primates
- I. Early primates
 1. geological time scale
 2. plate tectonics
 3. Paleocene primates
 4. Eocene primates
 5. Oligocene primates
 6. Miocene hominoids
 7. phylogeny
- J. Early hominids
 1. the bipedal adaptation
 - a. the foramen magnum
 - b. the pelvis
 - c. the vertebral column
 - d. the foot
 - e. the femur and hip joint
 2. pre-Australopithecines
 3. Australopithecines
 4. cranial and post-cranial morphology
- K. The genus Homo
 1. Homo habilis
 2. Homo erectus
 3. Neandertals
 4. Cro-Magnons
 5. anatomically modern Homo sapiens sapiens
 6. cranial and post-cranial adaptations
 7. the archaeological record
 8. lithic technology

VI. METHODS OF INSTRUCTION:

- A. practice quizzes
- B. **Lab** - laboratory sessions laboratory assignments laboratory manual
- C. **Lecture** - lecture textbook
- D. **Audio-visual Activity** - visual aids such as PowerPoint slides and web-based graphics
- E. videos
- F. CD-ROM-based "virtual laboratory" exercises
- G. pen-and-paper exercises
- H. models, fossils, and fossil casts
- I. **Research** - internet-based research and references

VII. TYPICAL ASSIGNMENTS:

A. Pen-and-paper based lab work 1. Determine whether or not you can roll your tongue. What are the possible genotypes for this trait? Make a Punnett square to help you answer the following questions: a. Assume that you are heterozygous for tongue-rolling. If you have children with another heterozygote, what are their possible genotypes? What are their possible phenotypes? Use the letters R and r to represent the dominant and recessive alleles. b. If you cannot roll your tongue and you have children with someone who is heterozygous for tongue-rolling, what are the possible genotypes and phenotypes for your children? 2. Use the dental eruption chart to determine the age of these individuals (chart and photos or models of crania provided). 3. If you were examining a number of mammal skeletons, what characteristics would you use to decide whether an individual was a primate or not? a. Circle the characteristics you would use: 1. fur 2. forward-facing eyes 3. relatively large brain 4. opposable thumbs 5. relatively small olfactory bulbs 6. mammary glands b. Explain why you did not choose each of the answers you did not circle. B. Laboratory exercises 1. In your lab, find and identify the following vertebrae, noting the features you used to make your identifications. a. atlas b. axis c. cervical vertebra from C3 - C7 d. thoracic vertebra e. lumbar vertebra f. sacrum g. coccyx 2. Using available cranial models, determine the continental ancestry of each. Explain in detail how you arrived at your conclusions. 3. Using the artifact reproductions provided, answer the following questions about lithic technology. a. What would make you think that Oldowan tools were the product of human creativity, rather than a bunch of random rocks? What do you think they could be used for? b. In what specific ways do Oldowan tools differ from Acheulian tools? What could Acheulian tools do that Oldowan tools could not? C. CD-ROM or web-based exercises. 1. Complete lab number 6 in John Kappelman's Virtual Laboratories for Physical Anthropology. Submit an essay summarizing the exercise and what you learned from it. 2. Go to the Dolan DNA Learning Center's webpage of biology animations at <http://www.dnalc.org/ddnalc/resources/animations.html> and view the Chromosome 11 flyover. Submit an essay summarizing the exercise and what you learned from it. D. Field trips for captive primate behavioral observations 1. For at least four species of primate at the zoo, answer the following questions: a. Give both the common name and the scientific name for the species. b. To which suborder does the species belong? How can you tell? c. To what infraorder does the species belong? d. To which superfamily does the species belong? e. In what kind of habitat is the species found? f. Where is the species found geographically? g. What is the primate's body size? h. Compare the primate's hands to human hands. i. What is the primate's mode of locomotion? j. Does the primate have a tail? If so, how is it used? How long is it in relation to the primate's body? k. How many individuals are in the exhibit? What are their ages and sexes? l. Are they sexually dimorphic? m. Describe the behaviors you observe. E. In-lab practice quizzes (open book). 1. What are the components of the axial skeleton? 2. What are the five kinds of vertebrae? 3. Name a feature that differentiates all seven cervical vertebrae from the other vertebrae.

VIII. EVALUATION:

A. **Methods**

- 1. Exams/Tests
- 2. Quizzes
- 3. Lab Activities

B. **Frequency**

- 1. Laboratory exercises and assignments; weekly
- 2. Laboratory practical exams; at least two
- 3. In-lab practice quizzes; at the instructor's discretion
- 4. Midterm and final examinations

IX. TYPICAL TEXTS:

- 1. Walker, Suzanne E. *Exploring Physical Anthropology: A Lab Manual and Workbook*. Morton Publishing Company, 2007.
- 2. Kappleman, John *Virtual Laboratories for Physical Anthropology*. 3rd ed., Thompson/Wadsworth, 2003.
- 3. C. Whitehead, Paul F., Sacco, William K., and Hochgraf, Susan B. *A Photographic Atlas for Physical Anthropology*. Morton Publishing Company, 2007.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. lab textbook
- B. lecture textbook/workbook
- C. LPC computer access and/or print card
- D. computer/Internet access at home or ability to access the LPC on-campus facilities