## Anthropology 151L
NM HED Area III: Laboratory Science Competencies
UNM Core Area 3: Physical and Natural Sciences

**Student Learning Objectives:**

Students will be able to:
- Generate hypotheses from observations of the natural world, predictions of the hypotheses, and experiments to test the predictions **(Competencies 1 & 2)**
- Define the forces of evolution and explain their effects on levels of variation within and between populations **(Competency 3)**
- Use Mendel's laws to predict offspring genotypes and phenotypes from parental genotypes and phenotypes **(Competencies 2-4)**
- Apply the principles of the Central Dogma to generate amino acid sequences from DNA sequences **(Competencies 2-4)**
- Construct a phylogenetic tree showing the evolutionary relationships among primate taxa, and list the derived traits associated with each branch of the tree **(Competencies 2-4)**
- Predict primate social structures and mating systems from morphological and ecological data **(Competencies 2 & 3)**
- List the geographic range, time of origin and extinction, unique behaviors, and derived anatomical traits of the major hominin taxa **(Competencies 2 & 3)**
- Use the scientific method to test evolutionary and non-evolutionary hypotheses for the causes of variation in human mate choice, parenting, and cultural institutions **(Competencies 3 & 5)**
- Explain why the structure of human genetic and phenotypic diversity is inconsistent with the existence of biological races **(Competencies 2-5)**

**Assessment Procedure:**

**Competency 1. Describe the process of scientific inquiry.**

Which of the following is NOT a testable hypothesis?
a.       The amount of sugar that can be dissolved in water increases as the temperature of the water increases
b.       A divine creator is responsible for the origin of life
c.       All biological organisms arose in their present form and have never changed
d.       Some biological variation arose through a process of adaptation of individual organisms to their environments
e.       There is water on Mars

The definition of "theory" included which of the following ideas?
a.       A provisional conjecture that guides investigation
b.       A set of statements or principles devised to explain a group of facts or phenomena
c.       A set of statements or principles for which there is no evidence
d.       A thing that is indisputably the case
e.       A set of statements that do not allow to make predictions about natural phenomena

Which of the following is NOT one of the steps of the Scientific Method?
a.       Identify a single explanation for observed phenomena
b.       Design experiments to falsify predictions
c.       Generate predictions of hypotheses
d.       Observe the natural world
e.       All of the above are steps of the Scientific Method

**True/False**
The scientific method can be used to examine religious questions.

**Competency 2. Solve problems scientifically.**

Huntington's disease is an autosomal dominant disorder, meaning that only one copy of the abnormal allele is required in order for an individual to have the disease. If an individual that is heterozygous for the disease mates with an individual that is homozygous for the normal allele, what proportion of their offspring will have the disease?
a.      0%
b.      25%
c.      50%
d.      75%
e.      100%

If AAA AAA AAA is on one strand of a DNA double helix, what DNA sequence is on the other stand (the bottom strand is the "compliment" of the top strand)?
a.      TTT TTT TTT
b.      GGG GGG GGG
c.      CCC CCC CCC
d.      UUU UUU UUU
e.      WTF WTF WTF

What mRNA sequence will be transcribed from the DNA sequence AAA AAA AAA?
a.      TTT TTT TTT
b.      CCC CCC CCC
c.      UUU UUU UUU
d.      GGG GGG GGG
e.      WTF WTF WTF

If two individuals that are heterozygous for the sickle cell allele (Aa) mate with one another,  what is the chance that their child will have sickle cell anemia ?
a.      0%
b.      25%
c.      50%
d.      75%
e.      100%

On a trip to the Albuquerque zoo, if you see a primate with outward pointing nostrils, you  know that it is native to _____.
a.      Africa
b.      Asia
c.      Europe
d.      North America
e.      South America
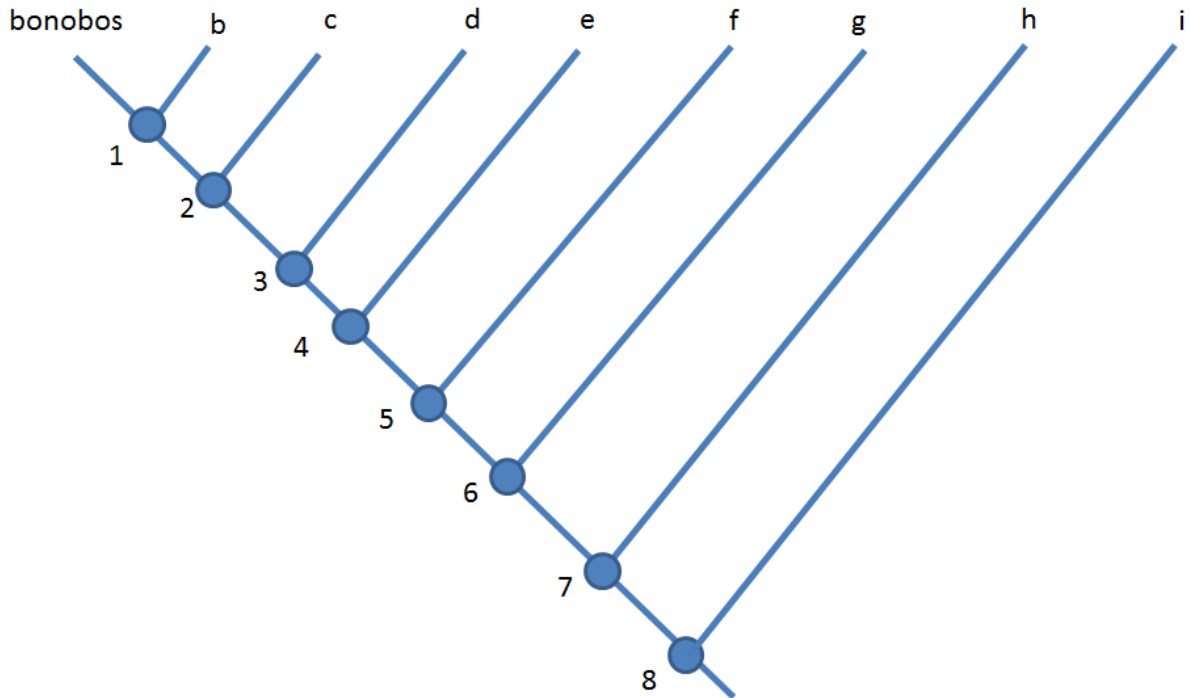
The above phylogeny of the primates includes chimpanzees, gibbons, gorillas, humans, new world monkeys, old world monkeys, orangutans, prosimians

In the above phylogeny, what species belongs at position 'b?'

a. chimpanzees
b. humans
c. gorillas
d. prosimians
e. gibbons

In the above phylogeny, what species belongs at position 'c?'
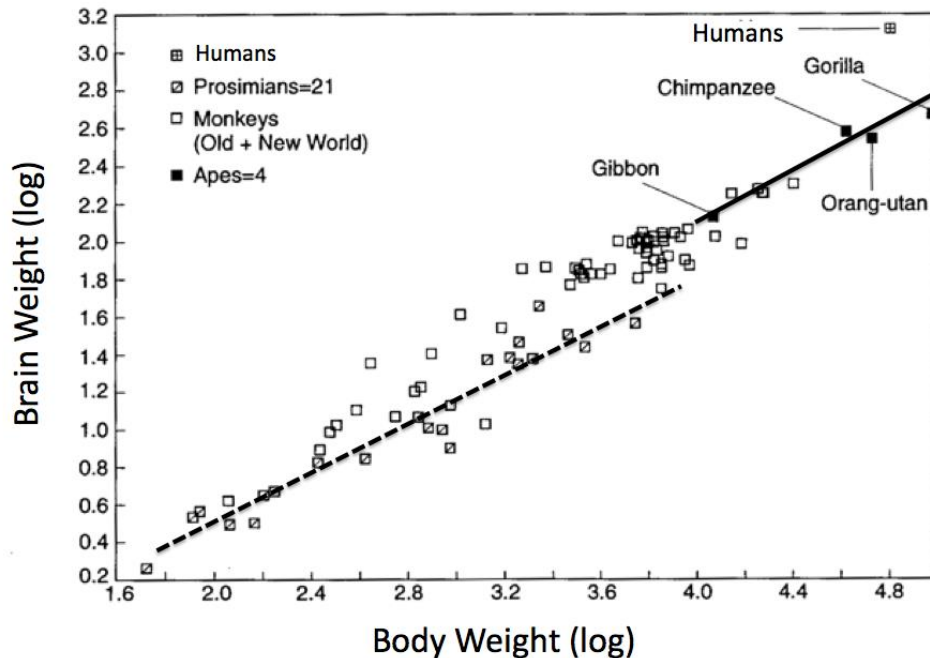
a. chimpanzees
b. humans
c. gorillas
d. prosimians
e. gibbons

In the above phylogeny, what species belongs at position 'f?'

a. chimpanzees
b. humans
c. gorillas

d. prosimians
e. gibbons

In the above phylogeny, what species belongs at position 'i?'

a. chimpanzees
b. humans
c. gorillas
d. prosimians
e. gibbons

**Competency 4. Apply quantitative analysis to scientific problems.**



The dotted line in this graph shows the relationship between brain weight and body weight for prosimians (a primitive primate group). The solid line shows the same relationship for apes.

How would you interpret the relationship between brain weight and body weight?
a. brain and body weight are negatively correlated
b. brain and body weight are negatively correlated
c. humans have lower than expected brain size for their body weigh
d. gorillas have higher than expected brain size for their body weigh
e. monkeys have larger brains that apes


According to this graph comparing mtDNA from humans, Neanderthals, and chimpanzees:
a.     Humans are genetically more similar to chimpanzees than to Neanderthals
b.     Humans are genetically more similar to Neanderthals than to chimpanzees
c.     Humans and Neanderthals are indistinguishable from one another
d.     Genetic differences between humans and chimpanzees are three times higher than differences between humans and Neanderthals
e.     The average number of differences between any two humans is 10

According the graph:

a.      Suspensory primates have relatively short arms compared to quadrupeds and bipeds
b.      Homo erectus body shape suggests suspensory behavior
c.      Bipeds and suspensory primates are similar in arm to leg length ratios
d.      Bipeds have relatively long legs compared to suspensory primates
e.      Australopithecines are indistinguishable from apes

In the above phylogeny, at what point do small canines evolve?
a. A
b. B
c. C
d. D
e. E
f. F

In the above phylogeny, at what point does obligate bipedalism evolve and suspensory behavior disappear?
a. A
b. B
c. C
d. D
e. E
f. F

In the above phylogeny, at what point do encephalization quotients similar to our own evolve?
a. A
b. B
c. C
d. D
e. E
f. F

Australopithecine faces and body sizes are highly sexually dimorphic.  What reproductive strategy do these traits suggest?
a.      monogamy
b.      polygyny
c.      polyandry
d.      asexual
e.      these traits are uninformative

Homo erectus teeth are significantly smaller than those of earlier hominids.  What does that suggest about its diet?
a.      H. erectus at tougher foods than earlier hominids

b.        H. erectus ate harder foods than earlier hominids
c.        H. erectus ate softer foods than earlier hominids
d.        H. erectus ate more leaves than earlier hominids
e.        Tooth size and diet are unrelated

If you find a fossil in South Africa that is 2 Ma with a sagittal crest, large teeth, and large mandible, it is likely to be:
a.        Ardipithecus ramidus
b.        Australopithecus afarensis
c.        Australopithecus robustus
d.        Homo erectus
e.        Homo neanderthalensis

You have found a fossil locality in Central Africa that is probably at least one million years old.  There are no volcanic tuffs in the area, but there are iron-rich sediments.  What dating technique would work best for assigning an age to your site?
a.        paleomagnetism
b.        potassium-argon dating
c.        oxygen-18 isotope dating
d.        carbon-14 isotope dating
e.        carbon-13 isotope dating


You find a fossil hominid skeleton and determine that is was bipedal.  What features could have led you to this conclusion?
a.        anterior placement of the foramen magnum
b.        curved toes
c.        valgus knee (angled femur)
d.        A and C only
e.        All of the above

**True/False**
  • The relationship the same for both taxonomic groups.
  • Humans have larger brains that predicted by their body weight
  • Orangutan brains are larger than chimpanzee brains
  • Orangutan body weight is greater than gibbon body weight

**Competency 5. Apply scientific thinking to real world problems.**

The following is an article from a popular science magazine:

July 1, 2010

Intelligence Averages Linked to Regional Infectious Disease Burden

Over the years, people have put forth a lot of theories to explain why intelligence differs, from person to person and even around the world. Health, wealth, schooling, nutrition, and even climate have all come up. Now, researchers at the University of New Mexico suggest that parasites might play a role. They find that the prevalence of infectious diseases can be a powerful predictor of regional smarts. Their work appears in the Proceedings of the Royal Society.

It takes a lot of energy to build and operate a human brain. This needy organ commands 87 percent of the body's metabolic budget in infants, and about 25 percent in adults. So things that sap our energy are likely to hinder our intellectual growth. That's why malnourishment's not good for the mind.

But what about parasites? Fighting off nasty bugs can take a lot out of you. So the scientists got to wondering whether excessive infections might correlate with impaired cognitive development. Looking at IQs from around the world, they found that high levels of infectious disease go hand in hand with lower average national intelligence.

**Questions**
What hypothesis is being examined by the New Mexico Researchers?
a.
b.
c.
d.
e.

What predictions does the hypothesis make?
a.
b.
c.
d.
e.

How did they test these predictions?
a.
b.
c.

d.
e.

What alternatives explanations might exist for the relationship between malnourishment and IQ?
 a.
b.
c.
d.
e.


## Assessment procedure

At the end of each term, all students in each section of Anthropology 150 will take an online exam consisting of five questions randomly drawn from each of the four competencies, for a total of 20 questions. The average grade for each competency will be collated by members of the undergraduate committee. The committee will report the grades to the Anthropology 150 professors, who ill them meet to evaluate the results. The professors will identify the competency with the lowest average score, and will work together develop curricular changes to improved instruction.

**GROUP IV:  SOCIAL AND BEHAVIORAL SCIENCES**

**ANTHROPOLOGY 101:  INTRODUCTION TO ANTHROPOLOGY.**

**Student Learning Objectives:**

1) Overview understanding of the objectives and methods of the different subfields of anthropology
2) Basic operationalization of basic tools of anthropological inquiry: holism, comparativism and relativism.
3) Understanding of the biological/genetic  unity of the human species  and its evolutionary origins and sequences
4) Critical evaluation of the development of food production strategies and social complexity in human history
5) Basic application of anthropological tools in approaching cultural diversity.

**Assessment Procedure:**

***Competency 1: Relationship between culture and language and how that relationship colors and influences all that we do as human.***

***Example*** of a multiple choice question that addresses this relationship:

Which of the following statements best describes how anthropologists think about the relationship between language and culture?
a) different languages construct entirely distinct and different cultural universes
b) language and culture mutually define one another and are necessary for one another's existence
c) language determines culture
d) cultural changes led to the creation of the different languages in the world

A second part of building Competency 1 in this course requires that students gain an appreciation of the range of cultural traditions in the past through lectures and readings on topics in prehistoric archaeology including the earliest stone tools, the Upper Paleolithic "revolution", the original of agriculture [domestication of plants and animals] and on the development of the pristine states. In the part of the course that deals with state development, we emphasize commonalities in development and the diversity of outcomes.

***Example*** of a multiple choice questions that addresses this historical variation:

Which of the following kinds of data are important and necessary for the study of the human civilizations of the past?
a) human remains
b) artifacts
c) written records and oral traditions
d) environmental effects and changes
e) all of the above
f) a) and b) only

**Competency 2: Social Construction or Race and variation in the pristine states from prehistory.**

This competency builds on concepts learned in Competency 1. We address this this competency in two ways: 1) by highlighting the evidence for variation in the pristine states from prehistory, and then explore proposed hypotheses that explain this variation, and 2) by exploring an important tenant of Modern Anthropology that runs counter to folk beliefs--- that race is a largely a social construction. The construction often correlates with biological differences and that these differences between so-called races relatively small in comparison to the difference between individuals within each race.

**Example** of the kind of multiple choice question that could be asked:

Choose which of the following statements best describes how anthropologists of all subfields understand the phenomenon of race
a) race is a system of categories by which sociocultural significance is assigned to phenotypic differences that are genotypically insignificant
b) races developed in response to differing geographical and climatological conditions
c) race helps to explain how various cultures have developed over time and across the world
d) racial differences help to explain differences in intellectual and physical abilities in different areas of the world

**Competency 3: understand the relationship between language and culture; understand the social construction of race (see Competency 2.)**

This competency is address through much of the material on Cultural Anthropology (Ethnology) presented in the course.  Information on variation in human subsistence, marriage patterns, kinship systems, patterns of descent, religious, language, and cultural and linguistic change all serve to build this competency.  The challenge for outcomes assessment is to identify and focus on a subset of the concepts that students should obtain.  We meet this goal by asking questions about the relationship between language and culture and the social construction of race.

Example of a question on the relationship between language and culture:

Which of the following statements best describes how anthropologists think about the relationship between language and culture?
a) different languages construct entirely distinct and different cultural universes
b) language and culture mutually define one another and are necessary for one another's existence
c) language determines culture
d) cultural changes led to the creation of the different languages in the world


**Competency 4: understand the evolutionary history of the family of apes and humans; Critical thinking about the consequences of cultural relativism for current ethical problems.**

If this course is successful in meeting this competency, then students should 1) understanding the evolutionary history of the family of apes and especially humans and 2) be capable of critical thinking about the consequences of cultural relativism for current ethical problems. We ask questions to evaluate both aspects of this competency:

*Example:* Evolutionary History of Apes and Humans: Multiple Choice question:

Which of the following statements most accurately reflects the evolutionary relationship between the living great apes and our species?
a) *Homo sapiens sapiens* evolved from chimpanzee ancestors
b) *Homo sapiens sapiens* and all the great apes share a common ancestor, and their evolutionary lines diverged over 16 MYA
c) *Homo sapiens sapiens* evolved from an ape that most closely resembled the bonobo
d) it is unclear how *Homo sapiens sapiens* evolved from apes.

*Example*: Develop an understanding of cultural relativism:

Choose which of the following statements best describes cultural relativism:
a) cultural relativism means that there is no basis upon which to judge one's own and other cultures
b) cultural relativism means that anthropologists try to adopt the cultures of other peoples while they do fieldwork
c) cultural relativism leads anthropologists to judge religious fundamentalists harshly
d) cultural relativism allows anthropologists to accord validity to all cultural expression in order to try to understand how people in other cultures know about and behave in the world

## Assessment Results:

## Description of How Results Will Be Used To Make Improvements:

We will ask these questions in different ways at the beginning and end of the semester. Questions will be graded and performance compared for the change in performance. Faculty teaching this course will meet to assess whether the performance is sufficient for the particular competency and, if necessary, design strategies for improving learning in competencies. We are discussing adding "clickers" to help with performance.

**ANTHROPOLOGY 130: CULTURES OF THE WORLD**

<u>**Student Learning Objectives:**</u>

1. Be familiar with the basic methods and theories associated with cultural anthropology.
2. Have a broader understanding and appreciation for the diverse social practices found throughout the world.
3. Understand how anthropology approaches the core concepts outlined above (race, class, gender, language, globalization, etc.) and how these concepts may be used for cross-cultural analysis.
4. Be able to critically reflect on U.S. culture and society, including their home communities."

<u>**Assessment Procedure:**</u>

Please answer circle the answer to the following questions:

1. Which of the following statements best describes how anthropologists think about the relationship between language and culture?
    a. Different languages construct entirely distinct and different cultural universes that cannot be compared.
    b. Language and culture mutually reinforce one another and are necessary for one another's existence.
    c. Language systems are so culturally diverse that social scientists have no way of documenting them in a systematic fashion.
    d. Language wholly determines culture.

2. Which of the following statements best describes how anthropologists understand the phenomenon of race?
    a. Race is a system of categories by which sociocultural significance is assigned to phenotypic differences that are genetically insignificant.
    b. Races develop in response to differing geographical and climatological conditions.
    c. Race explains how different cultures have developed over time and across the world.
    d. Racial differences explain differences in intellectual and physical abilities.

3. Choose which of the following statements best describes cultural relativism:
    a. Cultural relativism means that there is no basis upon which to judge one's own and other cultures.
    b. Cultural relativism means that anthropologists try to adopt the cultures of other people while they do field work.
    c. Cultural relativism leads anthropologists to judge religious fundamentalists harshly.
    d. Cultural relativism allows anthropologists to accord validity to all cultural expression in order to understand how people in other cultures know about and behave in the world.

**Assessment Procedure:**

At the end of each term, all students in each section of Anthropology 151L will take an online exam consisting of five questions randomly drawn from each of the four competencies, for a total of 20 questions. The average grade for each competency will be collated by members of the undergraduate committee. The committee will report the grades to the Anthropology 151L professors, who will meet to evaluate the results. The professors will identify the competency with the lowest average score, and will work together develop curricular changes to improved instruction.