Biol 5250   Essay Instructions

The essay assignment is meant to improve your writing skills and your ability to synthesize information in biology. Biol 5250 has been designated a **communication-intensive** (CI) course, and the quality of your writing *absolutely* affects your grade. The assignment has two components: a detailed outline (due October 7) and a final essay (due November 16). *Please ask the TA for help at any stage of the process.*

Choose an exciting, unresolved topic from within the broad subject of human evolution. We provide sample topics and questions at the end of this handout. So you can get going quickly, we also provide *many* scientific references on the course website (a searchable PDF of ≈61 pages). You *must* use at least a few of these to construct your essay. Find additional journal articles using The Web of Science and Google Scholar. Links to these excellent sources are on the website.

Outline

The outline must include:
 - A tentative concise title (often phrased as a question)
- A list of 6-8 main points that you plan to address. Include the main topic and the important subtopics.
- An **annotated** bibliography with *at least* **five initial references**. List each source and **describe in a couple of sentences** below each reference how the reference will be useful for your final essay.

The outline represents **10%** of your final grade. It will be scored as follows:
8-10 pts – complete and scientifically accurate, at least five well-annotated references
5-7 pts – not sufficiently detailed or scientifically accurate, topic and subtopics are obscure
1-4 pts – incomplete, does not indicate the relevant subtopics or how the references fit the topic

Final essay

Write a thoughtful, engaging essay that conveys why the topic is interesting and important. The essay should consist of **7-8 pages of text**, with a minimum of seven full pages. Assume that the reader is unfamiliar with the topic but scientifically literate. One way to do this is to imagine that the reader is another member of the class. State your question *clearly* in the opening paragraph. Your ideas should follow a logical sequence, with good transitions between paragraphs.

You are strongly encouraged to complete a first draft early enough to get feedback from the TA. Pay careful attention to grammar, style, and spelling. Revise and proofread *many* times.

Do not include ANY direct quotes. It's tough to evaluate a paper sprinkled with the writings of others. *Any evidence of plagiarism will result in a score of zero.* There are two forms of plagiarism you must avoid. The first is portraying the ideas of others as your own by failing to cite a source. A second, more insidious form is copying sentences from a source that you *have* cited. Citing an author does NOT give you license to portray his or her writing as your own. *Cast each sentence in your own words.*

Provide a **reference list** after the 7-8 pages of text. Use the format in the Human Evolution References list on the website (*see point 11 on p. 3*). On the title page, include only the essay title. "Hide" your name at the end of the reference list. Use double spacing, a 12-pt font, and 1-inch margins throughout. Number each page at the bottom, and staple the pages together in upper left corner.

The final essay represents **25%** of your final grade. Each essay will receive a score out of 75 points. *See the scoring sheet and checklist that are available at the course website.*

How do I get going?

Perhaps the best way to get acquainted with a topic is to find a **recent** review article in the reference list. Instead of presenting a discrete piece of research, review articles summarize the overall state of a line of inquiry by providing a synthesis of many research articles. A good review gives a comprehensive introduction and a long list of relevant references. Focus on a particular aspect that interests you and begin to collect articles.

How do I make sense of the articles I have?

The scientific literature can seem pretty dense even to those of us who read it all the time, but there are a few tricks to getting what you need out of an article. First, remember that articles are not meant to be read like novels! Just scanning the abstract will help you decide whether an article will be helpful. If the article looks promising, focus on the introduction (which places the article in the context of current thought) and the discussion (which explains the relevance of the main results to the larger picture).

How do I cite articles?

Here's an example of citing a reference parenthetically in the text:

Humans have an especially large cranial capacity in relation to body size (Roth and Dicke, 2005). If there are more than two authors: *Roth et al., 2007* (*"et al."* means *"et alia"* or "and others")

Author names can also be a part of a sentence: *Pavard et al. (2008) argued that menopause is adaptive because of the heavy investment required for altricial human offspring.*

Omit the titles, first names, or institutions of authors:
Wrong: *Dr. Eliza Doolittle, a biologist at Whatsamatta U., first proposed in 2009...*
Right: *Doolittle (2009) proposed...*

Citations should appear in the *first* sentence that contains *specific* information from that source. *Cite only peer-reviewed, scientific articles.* Most of your citations should be the original research (data-containing) articles, *not* review articles.

How many citations do I need? You need enough to address your topic thoroughly. Usually this means **12-20 references**. Within this range, more is often better. Citing more papers causes you to integrate more information, and forces you to adopt a succinct style. *We expect a minimum of 12 references.*

Writing tips

1. **The most common mistake is a failure to read these instructions carefully.** Read the entire handout before you start, and *again* after you have completed a draft. When you *think* you are finished, re-read *this handout*, the *scoring sheet* and the *checklist*.

2. Choose a topic or question that you can adequately address in 7-8 double-spaced pages. "Sexual selection in humans" is *too broad*. Any ONE of the suggested questions below would be appropriate. If in doubt, ask! Before you begin writing, THINK. Ask yourself, what specific aspect of my topic do I want to write about? Try to "flesh out" your outline of the main topic and subtopics. Loosely decide where your references will fit in the final essay.

3. Begin generally and move to specifics. If your paper involves scientific jargon or detailed mechanisms, be sure to define and discuss these early in the paper. For example, if you write about the role of MHC loci in human sexual responsiveness, the reader will be baffled if you haven't made clear just what these loci are. Don't write about a topic that you don't understand.

4. **Make sure each paragraph has a clear topic sentence.** The initial sentence should tell the reader what to expect in the following sentences of the same paragraph. Each paragraph should finish with a sentence that eases the transition to the next one.

5. Focus on ideas, not examples. The paper will flow better if you remain focused on the main ideas and don't get lost in the particular examples used to support the main ideas or hypotheses. Otherwise, the paper will resemble a "laundry list" of one case study after another, with little cohesiveness.

6. Avoid a casual, conversational tone, but don't make the writing needlessly formal or stiff either. Some parts of speech are conversational and not appropriate for this assignment.
Wrong: "Why, it seems that, with all of these theories that scientists have come up with, it's tough to decide why bipedality evolved in the first place!"
Right: "Selective pressures leading to the evolution of bipedality remain unresolved." On the other hand, do not fill your sentences with excessive jargon and unnecessary 'ten-dollar' words.

7. **Avoid overuse of indefinite pronouns, such as IT, THEY, and THIS.** Overuse may cause the reader to lose track of *which* antecedent noun is represented by the pronoun.
Example*: Mate choice often depends on traits that are correlated with genetic quality. **This** leads to behaviors ...* Does "this" refer to "mate choice?" Does it refer to "genetic quality?" The antecedent to a pronoun must be *unambiguous*, or you should replace the pronoun with the actual noun.

8. **Genus and species names are *italicized*.** The genus must be spelled out the first time it appears. A full species name takes the following form: *Genus species* (e.g., *Homo sapiens*)*.* A generic name is capitalized (*Homo*); the specific name is not (*sapiens*). Do not use a scientific name as a possessive: *Homo sapiens*' cranial size... Instead: Cranial size in *H. sapiens...*

9. **Use appropriate verb tense.** The past tense is needed when you discuss specific results from past experiments. The present is better for describing the current state of knowledge. "Analysis of the FOXP2 gene in humans and chimps *revealed* that …" "Sexual selection *appears* to account for many aesthetic preferences of humans …"

10. **Be concise.** After writing a draft, note the main point of each paragraph. Make sure that paragraphs that address similar points are adjacent in the body of the text. Examine adjacent sentences. Are subjects and verbs repeated? Perhaps you can combine these sentences. Decide if each phrase adds anything, or is simply filler and can be deleted.

11. **Be careful with your text citations and reference list.** Make sure each citation in the text is listed in the references and *vice versa*. There must be a *one-to-one correspondence* between text citations and the reference list. USE THE REFERENCE FORMAT IN THE "HUMAN EVOLUTION REFERENCES" LIST ON THE COURSE WEBSITE:
Burke, D., and D. Sulikouski. 2010. A new viewpoint on the evolution of sexually dimorphic human faces. Evol. Psych. 8: 573-585.

Note the order: Author(s). Year of Publication. Title. Journal. Volume: Page numbers.

Sample topics: We provide references for most of these topics on the website. Titles of articles in the reference list may suggest additional questions. **Any *one* of these questions can serve as the central topic of an essay.**

Comparative evolution of hominoids: How do we account for large phenotypic differences between humans and chimps despite 95-99% sequence similarity at most genes? What is the role of insertions and deletions (indels) or duplications in the divergence of the human and chimp lineages? How do genomes of chimpanzees and other hominoids explain variation in human susceptibility to disease? What were the likely characteristics of the human/chimp common ancestor? Do the varying "cultures" of other hominoids show similarities with variation among modern human cultures?

Evolution of australopithecines and bipedal locomotion: When, where, and why did bipedality evolve? Is it related to the evolution of hair loss? How might locomotion on branches have predisposed australopithecines toward bipedality? Why are australopithecines considered only partially bipedal? What is the relationship between bipedality and tool use? What is the role of climate/habitat change? Which *Australopithecus* species is the most likely ancestor of *Homo*? Did the genus *Homo* arise in eastern or southern Africa? How does sexual dimorphism differ between *Australopithecus* and *Homo*? What were typical diets of australopithecines? What is the evidence that australopithecines may have flaked stone tools?

Evolution of high encephalization and consciousness: When and why did the lineage that led to modern humans evolve such a high brain-to-body size ratio? Are tool-making skills correlated with brain size? When did language evolve? When did pre-humans first display controlled use of fire? When did humans first start using symbolic objects (e.g., art, beads) or clothing? Which genes account for the evolution of high cognitive ability? What are the roles of kin selection and reciprocal altruism in human social behavior? How did the diets of *Homo* spp. diverge from those of australopithecines, and what is the relationship between encephalization and diet composition? How did the "re-modeling" of the brain contribute to our consciousness and high degree of cognition? What is the evidence that our brains are still evolving?

Biogeography and human evolution: What is the evidence supporting the replacement model for the evolution of anatomically modern humans? Have there been multiple migrations of anatomically modern humans out of Africa? What is the evidence that anatomically modern humans arose in Africa? How and when did anatomically modern humans spread across the Old and New World? How do genetic and linguistic data reveal a mainly Siberian ancestry of Native Americans? Was there genetic introgression from

Southeast Asia? How do the "Denisovans" or the "hobbit" species (*H. floresiensis*) fit into our understanding of human evolution?

Neanderthals: What happened to the Neanderthals? Did modern humans cause their extinction? Did Neanderthals have burials, language, or belief systems? When and where did they hybridize with anatomically modern humans? Did genetic introgression from Neanderthals provide adaptive alleles for modern human populations outside of Africa? Which alleles obtained from Neanderthals may have been maladaptive? What are the main biological or cultural differences between modern humans and Neanderthals? When did Neanderthals and modern humans share common ancestry and where did that common ancestor live? What is the evidence for hybridization with the "Denisovans"?

Sexual selection: What is the role of sexual selection in shaping behavioral and morphological traits of modern humans? Does variation in attractiveness conform to the "good-genes" hypothesis? Why are certain traits (e.g., waist-hip ratio in females, height and voice pitch in males) uniformly attractive across cultures? How important is fluctuating asymmetry? Do MHC-loci affect human mate preferences and sexual responsiveness? Are human mate preferences influenced by 'eavesdropping' and social learning? Is the human female orgasm an adaptive trait or simply a by-product of pleiotropy between the sexes (like male nipples)? What traits may have evolved to enhance pair-bonding in humans?

Reproduction: Why did the lineage that led to modern humans evolve concealed ovulation? Why is there a distinct female menopause (but a gradual loss of male fertility) in humans? Is human menopause explained by kin selection? Why do human populations maintain alleles for polyovulation and dizygotic twinning? Is pregnancy ("morning") sickness adaptive in humans? Are the high rates of spontaneous abortion in humans adaptive? What is the evidence for a maternal-offspring conflict *in utero,* and why might this be adaptive? How important are epigenetic marks *in utero* for determining offspring traits?

Human genome evolution and recent local adaptation: Given nucleotide substitution rates, how far back do we have to go to account for modern human genetic diversity (what are the typical coalescence times of nuclear and mitochondrial genes)? What is relative importance of drift versus selection in recent human evolution? What factors account for the recent evolution of variation in skin color, cold tolerance, or other characters? How do nucleotide substitutions suggest that variation in skin color and other traits was driven by selection? How does variation in human genomes account for disease susceptibility? Do evolutionary trade-offs explain the maintenance of alleles for intellectual-disability diseases as schizophrenia? Has the advent of civilization accelerated or retarded recent human evolution?

Evolutionary Biology – Biol 5250 – Fall 2016

MWF 9:30 - 10:20   BNR 314   Prerequisite: Genetics   CRN: 40791

Instructor: Frank Messina, frank.messina@usu.edu
Office hours: BNR 211, Wed 1 – 3 PM & by appointment

Writing TA: Shab Mohammadi, shab.mohammadi@gmail.com
Office hours: BNR 330, by appointment

The **course website** is on **Canvas,** and includes **sample exams, genetics problems** and **lecture power points.**

Grading and dates: **% of Grade**

1st Midterm:	Friday, September 30	20%
Essay Outline:	Friday, October 7	10%
2nd Midterm:	Friday, November 4	20%
Final Essay:	Wednesday, November 16	25%
Final exam:	Wednesday, Dec. 14, 9:30 AM	25%

The outline and final essay are due *at the beginning of class*. *We will not accept late submissions.*

Textbook: *None.* If you wish to buy or borrow one on your own, I recommend: Bergstrom & Dugatkin 2016. *Evolution*, 2nd Ed.

Grading: $\geq$ 93%: **A**   90-92: **A-**   87-89: **B+**   83-86: **B**   80-82: **B-**
77-79: **C+**   73-76: **C**   70-72: **C-**   66-69: **D+**   55-65: **D**   <55: **F**

Lecture Topics: 1 - Origin of genetic variation   **2** - Inbreeding & genetic drift   **3** - Gene flow   **4** - Natural selection & adaptation
5 - Quantitative genetics   **6** - Sexual selection   **7** - Kin selection
8 - Speciation   **9** - Systematics   **10** - Paleontology
11 - Evolution & development   **12** - Human evolution