

# PRINCIPLES OF EVOLUTION

**Instructor:** Dr. Curtis Clark  
**Office:** 8-132  
**Phone:** 869-4062  
**Email:** jcclark@csupomona.edu

## Recommended Texts:

Freeman, Scott, and Jon Herron. *Evolutionary Analysis*, **3rd Edition**. Prentice-Hall.

The third edition of this text is not yet available; it is expected to ship in late July. I have made arrangements with the publisher for the first several chapters to be available in advance copy for our use, so that you can purchase the third edition when it becomes available. There is a very good reason for this: The second edition has almost no resale value, and the third edition will be used in the future here at Cal Poly Pomona.

If you already have access to the second edition, go ahead and use it. But if you were planning to buy the textbook anyway (and it *will* be the source for test questions), *please* wait and buy the third edition. By doing this, you will be helping to convince the publisher that they can help out our students and still make a profit, and if you decide to sell the book at the end of the quarter, you'll actually get something for it. (If this is one of your first biology classes, you might want to hang on to the book, because it covers topics from several other classes from an evolutionary point of view, and will be a useful study aid.)

## Objectives:

Understanding the pattern of common descent of living organisms, and the processes that gave rise to their observed diversity.

## Grading:

First written assignment	10% of grade	Wednesday, Aug 27
Second written assignment	10% of grade	Wednesday, Aug 27
Midterm exam	40% of grade	Wednesday, Jul 23
Final exam (not cumulative)	40% of grade	Friday, Sep 5, 11:30 a.m. - 1:30 p.m.

**Written assignments** will be described separately. They may be handed in as paper copy, or sent as email plain text or attached Word, Works, or Word Perfect files.

**Exams** will be open book/open notes. They will be Scantron-graded multiple-choice. Make-up exams will only be given in the case of documented illness or for other compelling reasons, and may be written or oral, at my discretion.

## Grading scale:

90-100% = A; 80-90% = B; 70-80% = C; 60-70% = D.

**Prerequisites:**

BIO 110 or BIO 115

**Schedule:**

The chapters in the textbook will be covered in sequence.

**First written assignment:** *Evolution in the News*

This assignment is borrowed from Dr. Demboski's course. Newspapers and magazines frequently have articles that relate to evolutionary biology, in the broad sense that we use it in the course. Your assignment is to find such an article, either in paper or on the website of the newspaper or magazine, and write about it.

A successful assignment will be word-processed, typed, or written legibly, and will have the following parts:

1. A paper copy of the article or a correct URL to the article on the web. The purpose of this is to enable me to read the same article. If I can't, I won't grade your submission, so make sure that the URL works and that I don't have to be a subscriber to see the article.
2. A bibliographic citation of the article, in the format given by <http://www.csupomona.edu/~jcclark/classes/bio190/format.html> (you might want to read further in these web pages if you've forgotten BIO 190).  
10%
3. A brief summary of article, in your own words. 20%
4. The specific evolutionary concepts (that you learned about in class) that the article relates to. (You may freely cite your text and lecture notes, as long as you make it clear where the information came from.) 20%
5. A discussion, again in your own words, of why the subject of the article is important for evolutionary biology. Are there any significant contributions? Do the findings support current theories, or do they suggest new ways of looking at things? 50%

Remember that restating an idea in your own words isn't plagiarism, and exact copying isn't plagiarism if you *quote* the part you copied and *cite* its author and source.

The assignment is due at the beginning of the last class period, but if you turn it in before the end of July, I will give you a one-point (10%) bonus, since you will have had less background in evolutionary biology at that point.

**Second written assignment:** *Explain Evolution*

This essay question, borrowed from Dr. Bryant's course, is simply "Explain evolution" (he required his students to answer in class; you will do it as a take-home). You should write between 300 and 500 words. I will expect the answer to be word-processed, typed, or else written *very* legibly.

You need to say what evolution is, what the evidence is for evolution, explain the basics of evolutionary genetics, adaptation and natural selection, classification and

speciation, and macroevolution. I highly recommend you look at the summaries of relevant chapters in your textbook as you try to distill your thoughts for this essay. Below is an example essay from Dr. Bryant's handout as an idea of what is expected. You may *not* copy it or paraphrase it, and yes, I will check. (You also may not copy text directly from the textbook or any other source—that would be plagiarism—but you may restate in your own words.)

Bring the essay to the last class meeting.

*Evolution is genetic change in a lineage, which is a group of organisms and their ancestors and/or descendants through time. The study of evolution includes the study of evidence for evolution, population genetics, adaptation and natural selection, classification, and the rates and modes of evolutionary change. The evidence for evolution includes the fossil record, which shows ever more dissimilar fossils as rocks get older; laboratory experiments which can produce new species; artificial selection experiments which produce new kinds (dogs, cats, pigeons, and flowers, for instance); evolution on a small scale in nature (such as the peppered moth and insects evolving resistance to insecticides); the imperfectness of adaptation; and homologous similarities among organisms.*

*Population genetics is the branch of genetics which studies the ways in which genetic changes may occur in lineages. Such changes have been seen in extensive laboratory experiments, and the mathematical theory is well-developed. Five major forces can cause evolutionary genetic change: selection, migration, mutation, non-random mating and genetic drift. Of these, selection, which is a difference in reproduction among individuals, is the most generally important. Selection is also the only force that can produce an adaptation, which is a feature of an organism that allows it to reproduce better than if it lacked the feature.*

*Organisms may be classified in many ways, but the cladistic method is the most generally used today. This method involves classification by shared derived traits, and defines a species as the organisms in a*

*lineage between branching points of that lineage. Other methods of classification define species differently.*

*Fossils are traces of past life. Single-celled organisms arose at least 3.8 billion years ago, and large multi-cellular organisms arose in quantity 600 million years ago. Since then, there has been a general increase in the size and complexity of organisms on the planet. Evolution may proceed gradually with unnoticeable gradations from species to species (phyletic gradualism), or species may remain practically unchanged until a new species arises in a geologically short period of time (punctuated equilibrium). It is currently unresolved whether either phyletic gradualism or punctuated equilibrium is the case for most of evolutionary change. As far as the evidence goes, changes which result in new kingdoms, phyla or other large groupings are no different in kind than those which result in new species — macroevolution is brought about by the same processes as microevolution.*

*Species may go extinct due to competition, shifts in climate or other factors, and the majority of species that have lived on the planet are extinct. However, species do not "age"; that is, they appear to have a constant probability of extinction which does not increase with the length of time the species has existed. On occasion, many species go extinct simultaneously, which is called a mass extinction. The best studied of these, between the Mesozoic and Cenozoic, was caused by a meteorite that fell on the Yucatan Peninsula in Mexico, 65 million years ago. Probably most mass extinctions had other causes. (493 words)*