Goals: This class will focus on evolutionary relationships. You will gain a basic understanding of evolutionary trees (phylogenies) and the modern techniques used to estimate them, including some hands-on practice in constructing trees. You will learn the potential pitfalls of phylogenetic analysis and practice thinking critically about scientific claims.

Evolution is an overarching theme in biology; thus, a firm understanding of evolution is key to your success as scientists. As people pursuing advanced degrees in science, regardless of your particular field, evaluating scientific literature is a key part of what you do. All research is not equally good, and even the best studies have their limitations. By evaluating literature in evolutionary biology, you will hone your ability to evaluate other scientific literature critically.

My approach in this class will be to let each of you be responsible for your learning. We will not use a traditional "lecture, lecture, lecture → exam" format. We will be reading a lot, and we will use discussion to help improve our understanding of what we read. This approach will only work well if each of us participates fully. I will use participation in discussions and the quality of written reflection papers to try to evaluate your devotion to our endeavor.

Class web page: http://faculty.cns.uni.edu/~spradlin/SandE/home.html. A running list of assignments will be kept on this page, along with links to readings.


Tentative plans: We may find that we can and should read more papers than I have planned. If discussion begins to lag and be uninteresting or uninformative, we will compensate by picking up the pace on reading assignments.

My tentative plan is to divide the semester into 3 parts. The first part of class will consist mainly of an introduction to systematics and the meaning of phylogenetic trees; each student will be responsible for an individual chapter of the textbook. The second part of class will consist mainly of student-chosen scientific papers; each student will choose one systematic study to present to the class for discussion. These first two sections of class may blend together somewhat, as it might be more interesting to take a break from chapter discussions every once in a while for a scientific paper. The final portion of class will be devoted to developing a data set, analyzing it with the appropriate phylogenetic tools, and presenting the data in a scientific meeting style format.

Attendance: You are expected to attend and actively participate in every class. Under most circumstances, if a legitimate reason arises for you to miss class, I will expect you to contact me prior to the missed class. Unexcused absences will be reflected negatively on your participation score (see below).

Book chapters: For book chapter discussions, participation will be graded on a 30-point scale as follows:

- Knowledge of chapter ending questions/answers (ability to explain) = 10
- Pick 2-3 discussion topics from the chapter or from the questions = 10
- Show/explain 1 example paper associated with the chapter = 10
Participation: For most classes, participation will be graded on a 5-point scale as follows:

- 0 = unexcused absence
- 1 = present but looking bored
- 2 = present and engaged
- 3 = contributing one quick comment or question
- 4 = contributing two comments
- 5 = really being involved!

Paper presentations: Each student will be responsible for choosing one current, interesting paper for discussion for each of these sections. You must clear this paper with me at least one week prior to your presentation date. Remember that I may not agree with your first choice, so start looking for good discussion articles early. Failure to clear your paper on time will be reflected in your presentation score. You will be responsible for distributing your paper to the class (either electronically or hard copies in class) no later than the class period before your discussion is due. If you have a .pdf file, you can e-mail it to me for posting on the class webpage. Presentations will be graded on a 100-point scale as follows:

- Have an appropriate paper approved no later than one week before class = 10
- Have paper distributed to group no later than one period prior to discussion = 15
- Present background material for paper (e.g., on author, on species, on findings in other similar papers) = 30
- Promote discussion on strengths AND weaknesses of the paper = 20
- Have some discussion topics ready = 15
- Be ready to draw reluctant classmates out if necessary = 10

Paper reflections: For each scientific publication that we discuss, everyone should be prepared for critical discussion. To help with that, every student except for the discussion leader will write a one page reflection on the paper (due at the beginning of the discussion period). Reflection papers will be graded on a 10-point scale as follows:

- Summarize the most interesting findings of the paper (don’t plagiarize!) = 2
- Explain why this study was or was not worth doing = 2
- Identify what you view as the greatest strength of the study = 2
- Identify one weakness of the study = 2
- Identify one weakness of the article (presentation of the data) = 2

Project: In the last section of the semester, each student will be responsible for creating his or her own molecular data set that will be analyzed in a variety of ways. You will "mine" DNA sequence data from GenBank to create your own data set. Even if you have collected molecular data for your thesis, I want you to create a different data set for this project (the more different data sets you analyze, the more of a "feel" you get for the process). In class, we will discuss and perform several different kinds of data analysis on your data. Each student will give a 12-15 minute, meeting-style PowerPoint presentation. Presentations will be graded on a 100-point scale:

- Introduction to organisms = 15
- Literature review = 15
- Your analysis = 25
- Explain weaknesses in data = 10
- Explain which relationships are strongly or weakly supported = 20
- Summary = 15

Summary of Grading:
Chapter presentations ................................................................. 30
Participation (0-5 points per discussion/chapter day) ......................... about 140
Paper reflections (about 15 at 10 points each) .................................. about 150
Project presentation ................................................................. 100
Paper presentations ...................................................................... 100
Total ............................................................................................ about 520