Phylogenetic Biology
Fall 2016

Course Title/Number	Phylogenetic Biology BSC-679
Semester/Year	Fall 2016
Days/Time	Wednesday 1pm – 4 pm
Location	Science Building, Room 166 (computer lab on the 'Geology' floor) or Gillespie
Instructor	Dr. Emily Gillespie
Office	Science Building, Room 364
Phone	(304) 696-6467
E-Mail	gillespieE@marshall.edu (email is the best way to contact me—allow 24 hrs to
Office/Hours	1-2 pm Tuesdays and Thursdays, and 10:30 Wednesdays (others by
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/

Course Description

This course introduces students to the field of phylogenetics, in theory and in practice. Students will learn how phylogenetic biology fits into the broader field of biology (and beyond), and how biologists and others can think phylogenetically in their professional activities. Students will learn to critically evaluate the information contained in phylogenies, and to carry out all steps involved in constructing a phylogeny from data collection to phylogenetic analysis. Students will ultimately choose a project based on their interests, gather data, construct one or more valid phylogenies, and present the interpretation of their original research to the class.

Course Goals

Learning Outcomes: Be able to…	**Practiced by…**	**Assessed by….**
Recognize the applications of phylogenies and 'tree thinking' across all areas of biology and beyond	Identifying phylogenies in the primary literature used in different disciplines (e.g., evolutionary biology, human health, ecology, linguistics) and exploring what information they contain.	Demonstrating the ability to locate phylogenies in the literature and describe how the phylogeny was used. Describing the similarities and differences of how different disciplines employ 'tree thinking' Explaining the evolutionary context associated with any published tree
Interpret and summarize the information contained in a phylogeny in a scientifically accurate way	Locating and exploring phylogenetic trees and characterizing and evaluating the various kinds of information contained therein and the strength of statistical support for the tree	Summarizing and/or explaining the use of trees in the literature, characterizing the extent to which any particular tree is valid or useful using established criteria, critiquing how others

		use trees, critiquing the technical validity of trees
Analyze data by executing modern phylogenetic analyses	Downloading data from public databases, constructing alignments using different methodologies, selecting appropriate models of evolution, applying different phylogenetic analytical frameworks to datasets, and presenting dynamic trees to an audience	Summarizing the availability of relevant databases, evaluating and choosing the most appropriate alignment and the most appropriate phylogenetic strategy, implementing valid statistical tests for trees

Required Texts, Additional Reading, and Other Materials

1. Tree Thinking: An Introduction to Phylogenetic Biology (2013—1st edition) by David Baum & Stacey Smith –STRONGLY RECOMMENDED.
2. Phylogenetic Trees Made Easy: A How-To Manual (2011—4th edition) by Barry Hall- GOOD OPTIONAL RESOURCE.
3. Papers from primary literature, provided via Blackboard
4. Supplemental lecture materials/notes, provided via Blackboard

Course Requirements / Tentative Due Dates for major assignments/assessments

This is a graduate-level, small-enrollment course. The subject matter is frequently new to students. Therefore, we will handle this course as a 'professional workshop'. This means, we will use our 'class time' as time for trouble-shooting, discussion of literature, brainstorming, discussion of the text, etc….

The course will be almost entirely project-based. Your grade will be based upon completion of a novel, rigorous, phylogenetically-based project of your choosing. Your project idea requires approval, particularly if you need resources from the department. You will be asked to update myself and classmates most weeks and I expect steady progress toward your final project presentation and paper.

Please note that I expect graduate students to be internally motivated. What you put into this course is what you get out of it. I will not spend graduate students' time motivating you with quizzes or 'busy work'. I expect that you will run into obstacles, struggle with those obstacles, seek help with persistent obstacles, and display your best scientific behaviors.

Grading Policy

Your grade will be comprised as follows:

80% formal project (this will be broken down into milestones.

These milestones may not be on the same schedule for each student/project. This is necessarily part of a project-based course. Therefore, students will consult with Dr. Gillespie on an individual basis and receive regular feedback about their progress.

Phylogenetics projects are inherently discovery-based (although by extension they can absolutely be hypothesis-based). Therefore, neither you nor I can say exactly what your project will require, whether you generate a result that is exciting, or whether you discover an obstacle around which you cannot navigate and is outside your control. I simply expect you to make an honest, diligent effort. I will help you evaluate whether you have done so, on a regular basis.

10% other, incidental assignments. Anticipate a handful of these. They may include leading a paper discussion, an important assignment that is not directly related to your project, etc… Here, I am simply trying to give you credit for all of your efforts. You are welcome to suggest an assignment (for example, if you find yourself doing significant 'other' work that is not part of your project per se).

10% participation. I expect each student to contribute significantly any time we have group meetings, such as for paper discussions or troubleshooting projects. You may be asked to mine journals for papers for discussion, etc… You may essentially consider this component 'follow-through'.

This policy is negotiable, in terms of exact percentages. My prerogative is to give you credit for the work you do. However, at the graduate level, I expect that the work is motivated by a need to gain a skill, rather than points.

In short, if you put several hours a week of good, solid work into this project, follow through on items you are asked to, and give your classmates plenty of input, then you have acted as a good scientist and your grade will reflect that.

Attendance Policy

Attendance is expected any time we meet in person, for the duration of the meeting. Some class meetings will be formal, while others may be solo work in the computer lab or pair-meetings with a classmate. Simply monitor your email for announcements. With a small graduate class, we have tremendous flexibility, and I welcome your input as we determine how best to use our time together.

I do not deal with excused versus unexcused absences for graduate students. If you have something more pressing than class, I respect that. There are no formal points tied to attendance; I do not expect to discuss attendance with graduate students. Please be aware that if you fail to come to meetings, you are essentially not participating, regardless of the reason.