USC Dornsife
Dana and David Dornsife
College of Letters, Arts and Sciences

BISC 365: Phylogenetics and Evolution

2 units
Time: Friday 11 am – 12:50 pm

Instructor: Dr. Trond Sigurdsen
Office: AHF 139
Office Hours: TBA (or email me for appointment)
Contact Info: Email: sigurdse@usc.edu
Lecture Hall: ZHS 360

Required Literature:
Wiley and Liberman, 2011. *Phylogenetics: Theory and Practice of Phylogenetic Systematics.* 2nd Edition.

Additional readings will be provided in class (PDFs).

Course Description
BISC 365 will cover the methods used in order to infer phylogenetic relationships between organisms. The class is appropriate for students within biology or human biology with interest in evolution and systematics. These fields are fundamental to our understanding of the relationships of any biological group. We will start by discussing underlying biological philosophies of systematics such as the contrast between phenetics and cladistics. The use of morphological data versus molecular sequences will also be discussed. Students will further learn to interpret cladograms and phylogenetic trees, and how to produce such trees. Then we will move on to study the methods of using phyologenetic algorithms such as parsimony, Bayesian inference, and maximum likelihood.

Learning Objectives
BISC 365 will make the students proficient in the theory and practice of phylogenetic analyses in biological studies. They are expected to understand the use of such analyses in evolutionary studies. Rather than keeping everything theoretical, students will be required to create phylogenetic trees to work out the interrelationships between groups of higher taxa, species, or populations, given a set of data. This hands-on part of the course will primarily focus on the Phylogenetic Analyses Using Parsimony (PAUP) and MrBayes software packages.

Recommended Preparation: BISC 120 or HBIO 200

Course Notes
Each lecture is a combination of topics presented by the Instructor, as well as a seminar-type discussion. Students are expected to take active part in these discussions. Lectures will not be recorded, but any Powerpoint slides used will be posted on Blackboard. However, these do not

contain all the information needed, so it is very important to take part in the lectures, take notes, and participate in class.

Grading Breakdown

Assignment	**% of Grade**
Participation in class discussions	15%
Homework assignments	15%
Quiz Score	15%
Midterm Exam	20%
Final Exam	35%

Grading Scale

Course final grades will be determined using the following scale

A	95-100
A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

Assignment Submission Policy

Homework assignments should be emailed to the Instructor one week after the assignment was announced.

Grading Timeline

The graded assignements will be handed back to the student after one week. Final grades will be set four days after the final exam.

Course Schedule (Fridays at 11 am, starting Aug 21):

	Topic	Readings	Assignment due
Week 1	Introduction to systematics and phylogenetics, phenetics & cladistics	**Chapter 1**	
Week 2	Species and speciation	**Chapter 2**	**Homework 1**
Week 3	Hennigian cladistics	**PDF**	
Week 4	Monophyly, paraphyly, polyphyly	**Chapter 3**	**Homework 2**
Week 5	Cladograms. Rooting trees, nodes, polytomies	**Chapter 4**	
Week 6	Character apomorphies, homologies, homoplasies. Convergent evolution	**Chapter 5**	
Week 7	Parsimony, finding optimal trees, branch lengths, bootstrapping	**Chapter 6**	**Homework 3**
Week 8	**MIDTERM EXAM, 11 am**		
Week 9	Bayesian inference and maximum likelihood in phylogenetic analyses. Using phylogenetic software	**Chapter 7, PDF**	
Week 10	Classification, naming taxa, and the Phylocode	**Chapter 8**	**Homework 4**
Week 11	Biogeography and phylogenetics	**Chapter 9**	
Week 12	**Veteran's Day, Nov 11, no class**	**Chapter 10**	**Homework 5**
Week 13	Macroevolutionary hypotheses, summary, Q & A	**See PDF**	
Week 14	**Thanksgiving, no class**		
December 7	**FINAL EXAM, WEDNESDAY 11 am**		

Course Policies

1) Exam dates are firm. There are no makeup exams in the course. Performance on the final may be prorated to substitute for a missing midterm exam, if an excuse considered valid by faculty is presented in a timely fashion. An acceptable written excuse or documentation must be provided to the Instructor.

2) The midterm exam will be graded online by the professor and discussed during lectures. The final examination will not be returned but will be retained for one semester by the faculty.

3) Regrades: If you think an answer you have provided was graded incorrectly or if there is an arithmetic error, you may seek a regrade. You must provide a written explanation of why you think your answer was graded incorrectly. If a regrade is agreed upon, then the ENTIRE EXAMINATION may be subject to a regrade. Your grade may therefore go up, go down, or remain the same. Regrade requests must be received within one week of when the midterm exam is returned to the students, or by the second week of classes the following semester for the final exam.

4) No special assignments for extra credit are permitted.

5) Academic integrity policies of the University will be strictly followed (see below). Infractions can result in severe penalties. There may be assigned seating for exams. No student may be admitted to an exam after the first student has left the exam.

6) It may be necessary to make adjustments to the syllabus during the semester. Check the course website or class announcements on Blackboard for updates.

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, and hate crimes need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

Office of Student Accessibility Services (OSAS)

Provides certification for students with disabilities and helps arrange relevant accommodations. https://osas.usc.edu/about/contact-location-hours/

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or report a crime. Provides overall safety to USC community. dps.usc.edu