



University of Puerto Rico at Mayagüez
College of Arts and Sciences
Department of Biology



Course Syllabus

BIOL 4991/4 & 6994/7 - Introduction to Systematics

Semester: 1 st Semester 2007/2008	Credit hours: 3 credit hours	Contact hours: 4 contact hours
Course instructors: Dr. Matías J. Cafaro Office: B-203; ext. 3950 E-mail: mjcafaro@uprm.edu Dr. Nico M. Franz Office: B-304; ext. 3005 E-mail: franz@uprm.edu	Location, dates, and times: Lecture: Tuesday - 2:00 pm to 3:50 pm; Room B-388 Lab: Thursday - 2:00 pm to 3:50 pm; Room B-388	
	Prerequisites and concurrent requisites: Organismal biology background; permission of instructors.	
Description: A thorough introduction to the theory and modern practice of phylogenetic systematics, including parsimony analysis for morphological characters as well as likelihood methods for molecular information. The lectures will emphasize concepts and methods relevant to generating and evaluating phylogenetic trees, which are then applied in computer laboratory exercises with phylogenetics software packages (e.g., WinClada, PAUP*).		
Descripción: Una introducción profunda a la teoría y práctica moderna de la sistemática filogenética, incluyendo el análisis de parsimonia para caracteres morfológicos así como métodos de verosimilitud para información molecular. Las conferencias enfatizarán conceptos y métodos pertinentes a la generación y evaluación de árboles filogenéticos, los cuales se aplican luego en ejercicios de laboratorio de cómputos con paquetes de programas filogenéticos (p.e., WinClada, PAUP).		
Objectives: <ul style="list-style-type: none">- To understand and apply core themes and methods relevant to phylogenetic systematics.- To acquire working skills related to the creation and analysis of morphological and molecular character matrices, and evaluation of the resulting phylogenetic trees using a variety of methods of inference (parsimony, likelihood, etc.) and analytical software applications.		
Teaching strategies: x conference x computer laboratory x individual course project w/ presentation		
Course materials: <ul style="list-style-type: none">- Felsenstein, J. 2004. Inferring Phylogenies. Sinauer Associates, Sunderland, MA.- Hennig, W. 1966. Phylogenetic Systematics. University of Illinois Press, Urbana, IL.- Schuh, R. T. 2000. Biological Systematics: Principles and Applications. Cornell University Press, Ithaca, NY.- Wägele, J.-W. 2005. Foundations of Phylogenetic Systematics. Dr. Friedrich Pfeil, München.- Select articles, laboratory handouts, and other references provided throughout the course.		
Course schedule: [subject to changes]		

Date	Lecture	Lab
Aug. 9 (Thu)	-	Introduction; phylogenetics "by hand"
Aug. 14 (Tue)	Systematics; phylogeny, tokogeny, species	-
Aug. 16 (Thu)	-	Wagner trees; character optimization
Aug. 21 (Tue)	Homology - theory & practice	-
Aug. 23 (Thu)	-	Introduction to WinClada
Aug. 28 (Tue)	Character types & coding methods	-
Aug. 30 (Thu)	-	Character types & coding methods
Sep. 4 (Tue)	Phylogenetic inference with parsimony	-
Sep. 6 (Thu)	-	Tree search algorithms (parsimony)
Sep. 11 (Tue)	Monophyly & paraphyly; classification	-
Sep. 13 (Thu)	-	Tree statistics; consensus trees
Sep. 18 (Tue)	Consensus; clade support; congruence	-
Sep. 20 (Thu)	-	Calculating clade support; congruence
Sep. 25 (Tue)	Outlook: advanced cladistic methods	-
Sep. 27 (Thu)	[midterm exam: take-home]	DNA sequence data: how and where to get it
Oct. 2 (Tue)	Acquiring molecular data	-
Oct. 4 (Thu)	-	Sequence alignment (ClustalX)
Oct. 9 (Tue)	Methods and software for sequence analysis	-
Oct. 11 (Thu)	-	Introduction to PAUP*: the NEXUS file
Oct. 16 (Tue)	Distance methods, UPGMA, neighbor joining	-
Oct. 18 (Thu)	-	Parsimony analysis in PAUP*
Oct. 23 (Tue)	Molecular evolution	-
Oct. 25 (Thu)	-	Evolution models for ML (ModelTest)
Oct. 30 (Tue)	Maximum likelihood methods	-
Nov. 1 (Thu)	-	Maximum Likelihood analysis in PAUP*
Nov. 6 (Tue)	Bayesian analysis: theory	-
Nov. 8 (Thu)	-	Bayesian analysis (MrBayes)
Nov. 13 (Tue)	No lecture - academic Monday	-
Nov. 15 (Thu)	-	Open laboratory - individual course projects
Nov. 20 (Tue)	Testing models, trees and clocks	-
Nov. 22 (Thu)	-	No laboratory - recess (Thanksgiving)
Nov. 27 (Tue)	Presentation of individual course projects	-
Nov. 29 (Thu)	-	No laboratory - study period [course project]

Contact hours: 30 lecture + 30 laboratory = 60 hours total

Grading strategies and their relative weight:

<u>Task</u>	<u>Percent</u>	<u>Points</u>
14 laboratory reports	50%	240
1 midterm exam	20%	96
1 presentation - oral	10%	48
1 presentation - written	15%	72
∞ readings, discussions	5%	24
Total:	100%	480

Grading system:

quantifiable (letter grade)

not quantifiable

Special needs:

Students with special needs must identify themselves with the instructor and institution in order to receive proper accommodation in their courses and evaluations. Please contact the Servicio a Estudiantes con Impedimentos at (787) 832-4040, ext. 3250 or 3258, for additional information.

Annex

WebCT. Course resources will be made available through UPRM's WebCT service portal at <http://webct.uprm.edu>. Students are expected to access the Webpage several times per week for documents and announcements. Select articles will be assigned on a regular basis for reading and discussion in class.

Laboratory Reports. Each of the 14 computer laboratory reports must be handed at the beginning of the next laboratory session (1 day late = -2 points; 2 days late = -4 points; etc.). Students who miss a laboratory *still* have to make *the same deadline* (exception: attested sickness or other significant complications for the entire week).

Midterm exam and course project. The midterm exam is a take-home and will be handed out on September 25. It is due one week thereafter. In addition, during the second half of the course, students will propose in written form (one page), and subsequently (upon approval) prepare a comprehensive phylogenetic analysis of a taxon of choice using the available software applications. The results of the individual course projects will be shared in 15-minute presentations held November 27. The corresponding written reports (8-15 pages, single-spaced, including figures), are due one week thereafter.

