Research in Phylo-phenomics

BOT4935 (Section 18E1) - ZOO4926 (Section 18E4)

Spring 2016, 3 credits

I. Course meetings

Day	Classroom	Period	Time
Tuesday	Bartram Hall 227	5	11:45 AM -12:35 PM
Thursday	Bartram Hall 227	6,7	12:50 PM-2:45 PM

II. Course website

Course material and related information will be posted on Canvas: http://elearning.ufl.edu/. You can log in using your Gator link and password. On the site you will find the syllabus, PowerPoint presentations of the lectures (the day after the lecture), handouts, reading assignments, manuals, etc.

III. Instructor

Lorena Endara, Ph.D.

Office: 217 Carr Hall

Office Hours: by appointment

Email: clendara(at)gmail.com

IV. Course Description

The course will examine the importance of phenomic data (including morphology, physiology, and other phenotypic traits) in biological, and specifically phylogenetic, research. It will also introduce students to new computational approaches to assemble large phenomic datasets from taxonomic descriptions. The first part of the course will cover important concepts of taxonomic classification that are common to different disciplines in Biology. The students will also learn the techniques and software available to extract phenotypic data from taxonomic descriptions. In the second part of the course, the students will work with the instructors to generate novel phenomic datasets for phylogenetic and evolutionary analyses. This class provides an opportunity for students to participate in original, collaborative research and contribute to a broader research effort. The class will focus on plants, but the same techniques can be used to extract phenotypic information from descriptions of other organisms.

V. Course Objectives

Students will learn how to extract phenotypic data from taxonomic descriptions using new computational tools specifically designed for the purpose.

Specific objectives include:

1. Discuss processes by which species are circumscribed, named, and described.
2. Examine ethical and professional issues involved with naming and describing species.

3. Discuss the historical importance of phenomic characters in studies of evolution and biodiversity.
4. Examine various ways phenomic characters are being used in modern evolutionary and ecological research.
5. Understand the foundations of descriptive taxonomy, including how to measure and describe the variation of a taxon.
6. Examine modern tools for phylophenomics and descriptive taxonomy, including tools to generate and analyze phenomic datasets.
7. Generate matrices of phenomic characters that will be used for evolutionary inference.
8. Discuss how phenomic characters and data matrices can be evaluated.

VI. Required Materials

You will need access to a computer with an internet connection to complete the ~5 hours of research each week. Reading materials and software will be made available on the class website on Canvas or freely available on the internet.

VII. Evaluation of Grades

	Percent of Grade	Total Points	Breakdown of points
Participation	30%	300	Attendance – 100 pts Readings – 100 pts Providing feedback – 100 pts
Assignments	20%	200	Five (5) assignments - 40 pts each
Matrices	30%	300	Term classification – 30 pts each Raw matrix – 60 pts each (x 2) Final matrix – 60 pts each
Poster	20%	200	Design, editing – 120 pts Presentation – 80 pts
TOTAL	100%	1000	

VIII. Grading Policy

Score	Percent	Grade	Grade Points
934-1000	93.4-100	A	4.00
900-933	90.0-93.3	A-	3.67
867-899	86.7-89.9	B+	3.33
834-866	83.4-86.6	B	3.00
800-833	80.0-83.3	B-	2.67

767-799	76.7-79.9	C+	2.33
734-766	73.4-76.6	C	2.00
700-733	70.0-73.3	C-	1.67
667-699	66.7-69.9	D+	1.33
634-666	63.4-66.6	D	1.00
600-633	60.0-63.3	D-	0.67
0-599	0-599	E	0.00

More information on grades and grading policies is here:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

IX. Class Attendance and Make-Up Policy
Class attendance is expected. Each unexcused absence will result in a 10 point reduction in the final grade. Excused absences are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Late assignments will not be accepted. Students who miss class or final presentations should document the circumstances; the instructor will evaluate the circumstances and arrange for makeup material, if circumstances allow it.

X. Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

XI. Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

XII. Class Demeanor
Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

XIII. Materials and Supplies Fees

There are no additional fees for this course.

XIV. University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

XV. Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies

XVI. Outline of Lectures (Spring 2016)

Month	Date	Lecture	Topic	Activities: A=Assignments, M= Matrices, P=Poster
January	5	1	Introduction to course and objectives	
	7		**-Class cancelled-**	
	12	2	Historical perspectives of classification of organisms and the role that phenomic data played	
	14	3	How is descriptive science done? How are organisms named and described?	A1. Description of organism (In class assignment -40 pts.)
	19	4	Introduction to species concepts overview of descriptions	
	21	5	Overview of hierarchical classification and different classification systems	
	26	6	Introduction to "Model Dataset"	
	28	7	Practice measuring and describing species with a model dataset	
February	2	8	Manual generation of phenomic matrices	A2. Phenomic matrix using Model System (40 pts.)
	4	9	Modern Tools for Phylophenomcis I: ETC website and matrix converter software	A3. Generate matrix and provide statistics (Take home assignment - 40 pts.)
	9	10	Modern Tools for Phylophenomcis II: Introduction to Morphobank	A4. Deposit model dataset matrix in Morphobank (Take home assignment – 40 pts.)
	11	11	Introduction to Gymnosperms -Begin research projects -Extract descriptions, prepare them for analysis and start uploading descriptions	A5. Organismal research (Take home assignment 40 pts.)
	16	12	(Discussion) Evaluating data and descriptions to use in phylophenomic research -Parse text using ETC website	
	18	13	Introduction to controlled vocabularies -Start classification of words	
	23	14	Discuss decisions about classification of descriptive terms and the implications of these decisions on downstream analyses.	
	25	15	Matrix Generation -Evaluate and discretize characters I	M1. Term categorization (in class – 30 pts.) M2. Raw Matrix I (in class – 60 pts.)
			SPRING BREAK – No class	

March	8	16	Evaluate and discretize characters II	
	10	17	Evaluate and discretize characters III	M3. Turn in final Matrix I- provide statistics (60 pts.)
	15	18	(Discussion) Evaluation of first phase Introduction to "Poster" class assignment	
	17	19	Begin second research project – Matrix II -Extract descriptions, prepare them for analysis and start uploading descriptions	
	22	20	Parse text using ETC website	
	24	21	Start classification of words Parse text obtain matrix	M4. Term categorization (in class – 30 pts.) M5. Raw Matrix II (in class – 60 pts.)
	29	22	Matrix Generation -Evaluate and discretize characters I	
	31	23	-Evaluate and discretize characters II	
April	5	24	Evaluate and discretize characters III	M6. Turn in final Matrix II- provide statistics (60 pts.)
	7	25	Poster design	P1. Participation on poster (60 pts.)
	12	26	Phenomic data obtained using NLP and its uses for evolutionary and ecological inference	
	14	27	Deposit matrices in Morphobank Poster editing	P2. Participation on poster (60 pts.)
	19	28	Poster presentation	P3. Poster presentation (80 pts.)