Psychology 3850: Acoustic Analysis for the Behavioral Sciences
Spring 2017

Class meetings: Wednesday 15:00-17:50   **Professors**: Fangfang Li & David Logue
Location: B515, University Hall   **Office hours:** By appointment
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Course description: This course is intended to introduce the physical properties of sound, sound measurement, and sound analysis, as they relate to the vocalizations of humans and other animals. The course will offer hands-on practice on the application of acoustic analytical tools such as Syrinx, Luscina, and Praat. Students will have the opportunities to analyze their own sound samples, as well as samples provided by the instructors.

Coursework and grading:
Your final grade is made up of three components. First, you will be assigned three lab reports throughout the semester, each of which is worth 15%. Second, there will be 5 quizzes, each worth 5%. The quizzes are designed to test your comprehension of acoustics, acoustic analytic techniques, and the assigned readings. Third, you are expected to work on a final project of your own interest and demonstrate your proficiency of utilizing the sound analysis tools through an oral presentation (10%) and a proposal (20%).

Lab reports (3×)	45%
Quizzes (5×)	25%
Final project	30%
Total	100 %

Grading scale:

A+	95 – 100	B+	80 – 84.9	C+	67 – 69.9	D+	55 – 59.9	F	0 -49.9
A	90 – 94.9	B	75 – 79.9	C	63 – 66.9	D	50 – 54.9		
A-	85 – 89.9	B-	70 – 74.9	C-	60 – 62.9				

Lab reports: You will work in pairs (grouped by the instructors) for the three assigned lab reports. The labs provide hands-on experience with tools to analyze acoustic data. Use the lab reports to demonstrate your understanding of the concepts and methods from the lectures. You will have one week to complete each lab report. Each team will submit ONE completed assignment. Assignments should be submitted through the Moodle system.

Final project: You will work in pairs for the final project too, but this time, you get to choose your own partner. For this project, you'll develop a research question that can be addressed with acoustic analysis of animal vocalization and/or human speech. You will

also need to demonstrate your knowledge of visualizing, measuring, and analyzing the data to be collected. You are expected to present your final project during the last class (10%) and submit a written report by the end of the semester (20%). The research proposal should be no more than 10 pages, double-spaced. The 10-page limit includes figures, but excludes references. Please follow APA format specified at this link (http://www.apastyle.org/learn/tutorials/basics-tutorial.aspx). You need to submit your proposal by 5:00pm, **April 7, 2017**.

Important to note: All written assignments have to be typed. No handwritten work will be accepted.

Late and make-up policy: There is a late submission penalty for lab assignments and the final proposal (50% reduction if received within one week; no credit thereafter). In order to avoid the disadvantage of this policy, please provide official written documents to justify your absence or late submission. This policy also applies to make-up quizzes.

Students with special needs: If you have special needs that require accommodation, it is your responsibility to contact Counseling Services to acquire an official letter concerning your situation. Accommodations will only be given upon receiving the official notification from that office.

Academic misconduct: We are contractually required to report suspected cases of academic misconduct to the University. The most common form of misconduct is plagiarism. Remember that any time you use the ideas or the statements of someone else, you must acknowledge the source in a citation.

Reading list:

You are expected to carefully read the assigned readings BEFORE each class. You will be quizzed on the readings during class time. You can find all the readings from the Moodle website.

Bradbury, J. W., & Vehrencamp, S. L. (2011). Principles of animal communication, Second Edition. (pp. 19-33)
Excerpt from a textbook on animal communication covering the basics of sound

Bradbury, J. W., & Vehrencamp, S. L. (1998). Principles of animal communication. (pp. 34-35)
Excerpt from a textbook on animal communication covering amplitude measurement

Bradbury, J. W., & Vehrencamp, S. L. (1998). Principles of animal communication .(pp. 42-73)
Excerpt from a textbook on animal communication covering Fourier analysis of sound

Hillenbrand, J.M., Getty, L.A., Clark, M.J., and Wheeler, K. (1995). "Acoustic characteristics of American English vowels," Journal of the Acoustical Society of America, 97, 3099-3111.
(http://talkingneanderthal.com/HillenbrandGettyClarkWheeler.pdf)

Tchernichovski, O., Mitra, P. P., Lints, T., & Nottebohm, F. (2001). Dynamics of the vocal imitation process: how a zebra finch learns its song. *Science*, **291**, 2564-2569.
A detailed description of the development of vocal signals in a songbird

Lachlan, R. F., Anderson, R. C., Peters, S., Searcy, W. A., & Nowicki, S. (2014). Typical versions of learned swamp sparrow song types are more effective signals than are less typical versions. *Proceedings of the Royal Society of London B: Biological Sciences*, **281**, 20140252.
Luscinia's designer uses it to identify discrete song types and characterize the structural typicality of song renditions

Lachlan (online) https://github.com/rflachlan/Luscinia/wiki
Study the following sections: Simple comparisons, Time-warping analysis, Multivariate parameter analysis, parameter export, distance matrix, distance distribution, dendrogram, and non-metric MDS. You probably won't understand everything the first time, but give it your best shot.

Tentative weekly schedule

Month	Date	Topic	Readings	Due date
Jan	11	Visual representation of sound	Bradbury & Vehrencamp (2011): pp. 19-33	
	18	Simple sound measurement	Bradbury & Vehrencamp (1998): pp. 34-35; 42-73	Quiz #1
	25	Lab #1		Quiz #2
Feb	1	Advanced sound measurement	Tchernichovski et al. (2001)	Lab #1 due
	8	Measuring sound similarity; manipulating sounds	Lachlan et al. (2014) AND Lachlan (online)	Quiz #3
	15	Lab #2		Quiz #4
	22	*No class*		
March	1	Praat and human language analysis	Hillenbrand et al. (1995)	Lab #2 due
	8	Praat coding		Quiz #5
	15	Lab #3		
	22	Working on final project		Lab #3 due
	29	Working on final project		
April	5	Final project presentation		
	7			Final project due