PURDUE UNIVERSITY

COLLEGE OF LIBERAL ARTS

ACOUSTICS OF SPEECH
LING 598/SLHS 519
Spring 2012

Instructor: Olga Dmitrieva
Email Address: ---
Office: Beering B290

Office Hours: Mon 4:30 pm – 5:30 pm
Fri 4:30 pm – 5:30 pm
Class Time: MWF 10:30-11:20
Classroom: Beering 282

COURSE OBJECTIVES

This course is an introduction to those aspects of acoustics most pertinent to understanding speech production and perception. By the end of the semester you should be able to:

- Define the physical parameters of sound waves
- Describe how sounds are created and how they propagate through a medium
- Explain the concepts of resonance and filtering as applied to speech production
- Explain and apply the acoustic theory of speech production
- Explain digital signal processing as applied to the analysis of speech
- Identify the spectrographic representations of consonant and vowel sounds
- Explain standard methods for measuring loudness of speech sounds
- Use your understanding of acoustics to explain aspects of hearing and the perception of speech

REQUIRED TEXTBOOKS

Johnson, K. (2003). *Acoustic and Auditory Phonetics* (3nd Ed.) Blackwell.

COURSE POLICIES

Students with Disabilities: If you believe you have a disability, medical condition or other special circumstances that may affect your participation in this course please contact the Dean of Students Office (Schleman 207, 4-1747) so that suitable arrangements can be made.

Attendance: Students are expected to attend all class meetings. If you must be absent you are still responsible for all of the material covered during that lecture. I recommend you make arrangements with your colleagues to borrow their notes and find out about the assignments if you miss class. I am not responsible for keeping you up-to-date on classes that you miss. **Note** that lectures will not necessarily cover all of the material presented in the textbook, and may cover material that is not in the textbook. You are expected to know and understand all material covered in the course, whether it is presented in lecture, lab, or assigned readings.

Reading assignments: All reading assignments for a given day should be completed before you come to class on that day. Readings will follow the attached schedule unless stated otherwise in lecture.

Lab Assignments: Homework will be assigned in class. You will have time during class to start each lab assignment, and in some cases may be able to complete it. Some assignments may require you to download and run various free computer programs. These may be done on your computer or in one of the ITaP labs on campus. Your homework is due one week after it is assigned unless otherwise noted. Assignments not turned in by the due date will receive a grade of 0.

Examinations: There will be a mid-term exam scheduled during regular class time (see the course schedule) and a final project, including final project presentation. You are expected to take the exams on the days and times scheduled. Make-up exams are only allowed under exceptional circumstances (see below).

Exceptional circumstances: Exceptional circumstances include religious obligations, serious personal illness or injury, sudden hospitalization or death of an immediate family member, and illness requiring home-stay of a dependent. If the absence can be anticipated (e.g. religious obligation), you must notify me at least one week prior to the date of absence. Unanticipated absences may be excused only within 1 week following the date of the absence and upon presentation of verifiable written documentation. If you have questions about this policy, please ask. You may also refer to the website http://www.purdue.edu/oop/univregs/pages/ac_regs_pro/classes.html.

Grading: Course grade will be based on performance on the in-class exam, homework/lab assignments, and on a project (described separately). Final grades will be weighted as follows: Exam, 30%; Labs, 40%, Final project, 25%, Attendance & class participation, 5%.

Student Academic Misconduct (a.k.a. cheating): You are welcome to *discuss* your homework assignments and work on them together with your colleagues, but you must *write* each assignment on your own. If you work together with colleagues, make sure you can also solve all the problems on your own when your colleagues are not there to help you. You may not collaborate with anyone on any exams. On all assignments, copying answers from classmates, allowing others to copy your answers, and all other forms of plagiarism and cheating as given in the university guidelines will result in a failing grade for the assignment, and the incident may be reported to the Dean of Students for disciplinary action. **Do not present the work of others as your own.** Please review carefully the brochure "Academic Integrity: A Guide for Students" available at the Dean of Students Office (Schleman 207) or online at: http://www.purdue.edu/ODOS/administration/integrity.htm

Student Rights and Complaints: The official policies of the University concerning student rights and complaints, honesty and academic misconduct can be found in the *Academic Procedure Manual*, and in *University Regulations*, available from the Office of the Dean of Students or at:
http://www.purdue.edu/ODOS/administration/

Any concerns about grades given on a particular assignment must be put in writing and given to the course instructor along with a copy (or the original) of the graded assignment. Your written statement should include a description of why you believe the grade to be incorrect, and what you believe the grade should be. The course instructor is the final arbiter on all such decisions. The only exception to this rule is obvious errors in arithmetic, which may be brought to the instructor's attention directly.

Campus Emergency: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course: Blackboard Vista web page, my email address: odmitrie@purdue.edu, and my office phone: 494-3815.

Tentative course timetable (subject to change)

WEEK	DATE	TOPIC/LECTURE	READING
Week 1	Jan 9, 11, 13	Course intro Introduction to sound waves Complex waves	Ch.1
Week 2	Jan 8, 20	No class Monday Filters	
Week 3	Jan 23, 25, 27	Microphones and recording Sampling and quantization	Ch.3
Week 4	Jan 30, Feb 1, 3	Digital signal processing Praat intro lab	
Week 5	Feb 6, 8, 10	FFT & LPC analysis Praat spectra lab	
Week 6	Feb 13, 15, 17	Auditory anatomy and hearing Decibels, loudness, and pitch	Ch.4
Week 7	Feb 20, 22, 24	Mid-term exam Acoustic theory of speech Intro to spectrogram	 Ch.2
Week 8	Feb 27, 29, March 2	Acoustics of vowels Vowels lab	Ch.6
Week 9	March 5, 7, 9	Fricatives Fricatives lab	Ch.7
Week 10	March 12, 14, 16	NO CLASS – Spring break	
Week 11	March 19, 21, 23	Stop consonants, voicing Place of articulation Stops lab	Ch.8
Week 12	March 26, 28, 30	Nasals, liquids, and glides Nasals, liquids, and glides lab	Ch.9

Week 13	Apr 2, 4, 6	Suprasegmentals Suprasegmentals lab	
Week 14	Apr 9, 11, 13	Speech intelligibility Theories of speech perception Cross-language speech perception	Ch.5
Week 15	Apr 16, 18, 20	Final project presentations	
Week 16	Apr 23, 25, 27	Final project presentations	
Week 17	May 30	***Final project due***	