

## HONORS ACOUSTICS

### SLHS 419A/519A and LING 598C Spring 2007

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Office Hours: Tu 1:30-2:30, F 1:30-2:30  
Class Time: MWF 3:30-4:20  
Classroom: BRNG B286

### 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 the perception of speech

### REQUIRED TEXTBOOKS

Rosen, S. & Howell, P. *Signals and Systems for Speech and Hearing*. Academic Press, 1991.

### 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.

**Time commitment:** Learning speech acoustics is time-consuming. It requires a good understanding of many quantitative (mathematical) and basic physical (acoustic) principles before one can even begin to approach the study of speech more specifically. In addition to the hours you spend in class and lab, you should plan on spending at least 6-8 hours per week reading, reviewing your notes, and doing other assigned activities (homework, using CD-ROMs, downloading and applying software packages, and visiting suggested websites). I also commit time to working with you. If there is any material that you do not understand, please come to my office hours, or make arrangements to meet at a different time. Do this sooner rather than later. This material is highly cumulative, and you will not understand new material if you have not learned and understood what came before it. Do not wait until the week before the exam to start studying!

**Attendance:** Students are expected to attend all lectures. In my experience, students who attend class regularly understand the material better and consequently earn better grades. 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 if you miss class. I am not responsible for keeping you up-to-date on classes that you miss (except under exceptional circumstances, see below).

**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.

**Math competence:** I assume that all students have a working knowledge of high school algebra. You must be able to add, subtract, multiply and divide whole numbers, negative numbers, fractions and decimals. You should be familiar with exponents and logarithms, though these will be reviewed briefly. You will need a **scientific calculator** to accomplish many of the homework assignments and exams. You should be able to calculate sines, logarithms and exponents on this calculator. If you have any concerns about your math skills please contact your TA as soon as possible.

**Homework:** Written homework is a valuable form of active learning that helps students understand the materials covered in lecture and labs. Homework will be assigned in class. You may or may not have time during class to complete some or all of the assignment. 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 & quizzes:** There will be two written exams scheduled during regular class time (see the course schedule). The exams will include multiple-choice, short-answer and calculation questions and short essay-type questions. There may be occasional short quizzes given during class.

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 your TA 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](http://www.purdue.edu/oop/univregs/pages/ac_regs_pro/classes.html).

**Grading:** Course grade will be based on performance on the in-class exams, quizzes, homework/lab assignments, and on a short project (described separately). Final grades will be weighted as follows: Exams & quizzes, 50%; Labs, 20%; Final project, 20%; Attendance & participation, 10%.

**Classroom atmosphere:** Please feel free to raise your hand to ask questions during lectures. I will do my best to answer your question in a timely manner. Please come to class prepared to participate. This is a small class, and I expect you to be able to work with me individually or as a group when called upon to do so. Please be respectful of your instructors and your colleagues. If you must discuss something while someone else is talking, please do so quietly. If your discussion *appears to be* disruptive to the instructor or to other students you will be asked to quiet down. If you must be asked to quiet down more than once, you will be asked to leave class for the day. If you must leave early or arrive late, please make sure you enter or leave as quietly and unobtrusively as possible.

**Student Academic Misconduct** (a.k.a. cheating): You are welcome to *discuss* your homework assignments 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 quizzes or 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/>.

In general, any problems should be brought first to me. You may also contact the department Head or one of the department Ombudspersons before going to the Dean of Students or the Dean of Liberal Arts. The Head of SLHS is Professor Bob Novak (B11, HEAV; Phone 494-3788, email: [novakr@purdue.edu](mailto:novakr@purdue.edu)). The SLHS Ombudspersons are Dr. Anne Smith (email: [asmith@purdue.edu](mailto:asmith@purdue.edu)) and Jeanette Leonard (email: [jsl@purdue.edu](mailto:jsl@purdue.edu)).

**Honors option:** This is an all-honors level course.