Hearing and Speech Sciences 722: Psychoacoustics

Fall 2015
Tuesdays 3:30-6 PM
ARC1123

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COURSE DESCRIPTION AND OBJECTIVES

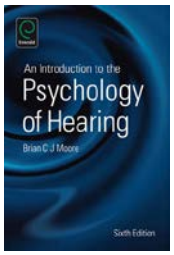
The auditory system of the brain has evolved to process the world of sounds. It allows us to detect the faint rustling of leaves that might signal the presence of a predator, to follow a friend's conversation in a loud and noisy bar, and to appreciate the subtlest of differences between melodies. Basically, the auditory system will save your life from the psychotic killers out there to get you.

This course will provide you with a solid understanding of auditory processing and psychoacoustics. Building on our knowledge gained in Instrumentation and Anatomy and Physiology, we will review basic acoustics, signals and systems, as well as fundamental knowledge of the auditory system. In the first half of the class, we will learn about the limits of auditory sensitivity and how to measure them. In the second half, we will explore supra-threshold auditory perception: the pitch of simple and complex sounds including speech, sound localization and binaural hearing, elements of speech perception, auditory scene analysis, and the consequences of hearing loss.

At the end of this course, the students should be able to:

1. Write the equations for and understand simple and complex acoustic signals.
2. Apply principles of systems analysis to the auditory system.
3. Describe the principles of signal detection theory, and how they are applied to measuring behavioral sensitivity.
4. Describe frequency, intensity, and temporal coding by the auditory system, across those with typical hearing, those with hearing loss, and those with cochlear implants.
5. Discuss principles of binaural hearing, sound localization, and auditory scene analysis by the auditory system.

COURSE REQUIREMENTS AND POLICIES



Materials Needed:

Text: Brian C. J. Moore, "An Introduction to the Psychology of Hearing" – 6th Edition
Emerald Group Publishing Limited, 2012
ISBN-13: 9781780520384

Calculator: A scientific calculator (one that calculates logarithms, sines, cosines, powers, etc.) will be necessary for this course and should be brought to every class.

Quizzes and Exams:

- Exercises (20-25 pts each): Four to five exercises will be provided each week, and due the following week.
- "Pop" Quizzes (10 pts each): There will be a **closed-book** pop quiz from time to time. Two will be dropped from your final grade.
- Exams (300 pts each): A midterm and a final will be given. The final is cumulative.
- Weekly quizzes and exams will be returned after I grade them.

Grading:

Your course grade will depend upon homework, quizzes, a midterm exam, and final exam. Students will be able to drop their lowest two weekly quiz scores. Grades will be on an absolute scale for the follow percentages:

A+: ≥100 A: 93-99 A-: 90-92
B+: 89-87 B: 83-86 B-: 80-82
And so on…

COURSE SCHEDULE

Date	Lecture Number	Topics Covered	Chapter	Readings	Homework
September 1, 2015	1	Signals Review, Psychophysical Methods, Signal Detection Theory	1	pp. 1-56, 127-131	Signals and SDT Homework #1
September 8, 2015	2	Cochear Implant Signals, Thresholds, and Temporal Integration	2	pp. 57-66, papers	2
September 15, 2015	3	Frequency Selectivity, Masking, and the Critical Band	3	pp. 67-94	3
September 22, 2015	4	Frequency Selectivity, Masking, and the Critical Band	3	pp. 94-125, papers	4
September 29, 2015	5	Loudness	4	pp. 133-166	5
October 6, 2015	6	Catch up and Review			
October 13, 2015	**7**	**Exam 1**			
October 20, 2015	8	Temporal Processing	5	pp. 169-189	6
October 27, 2015	9	Temporal Processing	5	pp. 189-202, papers	7
November 3, 2015	10	Pitch	6	pp. 203-243	8
November 10, 2015	11	Spatial Hearing	7	pp. 264-271	9
November 17, 2015	12	Spatial Hearing	7	pp. 271-281, papers	10
November 24, 2015	13	Pattern and Object Perception	8	pp. 285-312	11
December 1, 2015	14	Speech Perception	9	pp. 315-349	12
December 8, 2015	15	Practical Applications and Review	10	pp. 351-372	
December 15, 2015	**16**	**Final Exam**			