

Hearing and Speech Sciences 722: Psychoacoustics



Fall 2014

T 3:30 – 6:00

UNIVERSITY OF
MARYLAND –
COLLEGE PARK

Instructor: Matthew Goupell
Office: 0119E Lefrak (LEF) Hall
Office Hours: Mondays 1-3 PM or by appointment
Email: goupell@umd.edu

I would like to meet in person whenever possible, either during office hours or during class. You should only use email to set up one-on-one meetings or in cases of emergencies where you miss class unexpectedly. I typically have a 24+ hour turnaround time on emails.

My office is in a hallway which is normally locked. Please knock at the door closest to LEF0123. If you ever come to my office for office hours and I have stepped out momentarily, ask people in the locked hallway as to my whereabouts.



COURSE DESCRIPTION AND OBJECTIVES

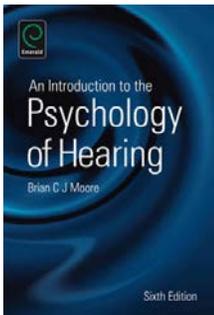
The auditory system of the brain has evolved to process the world of sounds. It allows us to detect the faint rustling of leaves that might signal the presence of a predator, to follow a friend's conversation in a loud and noisy bar, and to appreciate the subtlest of differences between melodies. Basically, 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. The course will be divided into three sections: in the first, we will review basic acoustics, signals and systems as well as fundamental knowledge of the auditory system. With these tools, we move on to the second section, in which we will learn about the limits of auditory sensitivity and how to measure them. In the last section, 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, and consequences of hearing loss.
5. Discuss principles of binaural hearing and sound localization by the auditory system.
6. Explain principles of auditory scene analysis.

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.

Attendance:

- Attendance to class is not required in this class; however, it is highly encouraged.
- Missed weekly quizzes will receive a score of zero. Make-up exams will not be provided.
- Midterm and final exams will not be provided to students who are more than fifteen minutes late for the start of the exam.
- Please inform me ahead of time about excused absences for missing class/quizzes/exams due to illness, family emergencies, religious observances, inclement weather, etc. so that I can try to accommodate your situation.
- In the extreme circumstance that you cannot inform me that you will miss an exam before it occurs, contact me as soon as you can so that **I can try** to accommodate your situation.

University Emergency Closing:

In the event that the University is closed for an emergency or extended period of time, I will communicate to you via email to indicate schedule adjustments, including rescheduling of examinations and assignments due to inclement weather and campus emergencies. Official closures and delays are announced on the campus website <http://www.umd.edu>. The snow phone line is 301-405-SNOW, as well as local radio and TV stations.

Class Participation:

Class participation is highly encouraged. Students are expected in class to perform ungraded writing, interact with other students and discuss ideas, speak to the entire class, etc. I will not waste your time regurgitating the textbook for you as a “sage on the stage.” The discussions are intended to find areas that the class do not understand and collectively address that deficiency. I will often wander about the room during our discussions to ask individuals questions. Thus, the course is not designed well for people who only like copying notes and not interacting.

Students are expected to treat each other with respect. Disruptive behavior of any kind will not be tolerated. Students who are unable to demonstrate civility with one another, the teaching assistants, or me will be subject to referral to the Office of Student Conduct or to the University Campus Police. You are expected to adhere to the Code of Student Conduct.

Other Electronic Devices:

- Cell phones and similar communication devices should be silenced before class time. If a cell phone or similar device audibly disrupts class, I will subtract five points from that person’s final grade. If no one admits to forgetting to turn off their cell phone, I will subtract five points from the grade of everyone in the class. Alternatively, if I forget to turn off my cell phone, I will add ten points to everyone’s grade.
- Laptop computers and smartphones are allowed. However, they cannot be used as your calculator during quizzes and exams.
- No pictures or videos during lectures please – I’m famous enough already.

Quizzes and Exams:

- Exercises (20-25 pts each): Four-five exercises will be provided each week, typically on Friday, and due the following Friday.
- Paper Reviews (20 pts each): We will typically read three papers on a given topic involving normal hearing, hearing impaired, and cochlear implant listeners.
- Weekly “Pop” Quizzes (10 pts each): There will be a **closed-book** quiz mostly every week. Three 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 three weekly quiz scores. Grades will be on an absolute scale for the follow percentages:

A+: ≥100	A: 93-99	A-: 90-92
B+: 90-87	B: 83-86	B-: 80-82
C+: 80-77	C: 73-76	C-: 70-72
D+: 70-67	D: 63-66	D-: 60-62
F: 59 or less		

Copywrite:

Class lectures and other materials are copywrited and may not be reproduced for anything other than personal use without written permission from me. Lectures, materials, quizzes, and tests may not be sold to other parties.

Academic Integrity:

It is the responsibility of all students to read and understand the misconduct guidelines of UM – College Park. (<http://www.testudo.umd.edu/soc/dishonesty.html>)

Any suspicion of academic dishonesty will result in a report filed with the Student Honor Council. Any of the following acts, when committed by a student, shall constitute academic dishonesty:

- CHEATING: intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- FABRICATION: intentional and unauthorized falsification or invention of any information or citation in an academic exercise.
- FACILITATING ACADEMIC DISHONESTY: intentionally or knowingly helping or attempting to help another to violate any provision of this Code.
- PLAGIARISM: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise.

Special Accommodations and Religious Inclusiveness:

I will make every effort to accommodate students who are registered with the Disability Support Service (DSS) Office and who provide me with a University of Maryland DSS Accommodation form. Only written DSS documentation of the accommodation will be considered. This form must be presented to me no later than **September 16, 2014**. I am not able to accommodate students who are not registered with DSS or who provide me with documentation which has not been reviewed and approved by UM's DSS Office after **September 16, 2014**.

It is the policy of the UM – College Park to not schedule exams on religious holidays. If I have accidentally scheduled an exam on a religious holiday that you observe, please let me know no later than **September 16, 2014**. I will reschedule the exam for the entire class to a more appropriate date.

Course Outline and Daily Preparation:

The course will be broken up into two sections, separated by the midterm. We will try to keep to the course schedule, but we will stay flexible depending on whether some material takes more or less time than planned.

Daily readings shown on the schedule should be done before coming to class. I highly encourage reading the weeks material again after class (I know, I know, that is a lot of reading!). Lectures as .pdfs will be uploaded to the ELMS site before the lecture (although I suppose sometimes corrections to the lectures will be made). Supplementary material such as figures, exercises, and other things will also be uploaded to the course website from time to time.

This class will focus a lot of time on the figures in the textbook and papers that we read. Everyone will be engaged in class to describe the figures and the deeper meanings of them. Your weekly preparation should focus on discussing the figures and experiments in depth.

I highly encourage you to attempt the exercises by yourself at first, but do not spend an inordinate amount of time on exercises that you cannot do. Getting together with classmates to (1) have them teach you how to do the exercises you can't do and (2) have you teach them how to do the exercises they can't do would be excellent preparation for the exams and working with colleagues in this field. During this time, you can also discuss unclear concepts from the text. Finally, I suggest attempting the exercises again at a later time to see if you can do them. Practices makes perfect you know. Solutions will be posted sometime after the material is covered for a given chapter.

COURSE SCHEDULE

Date	Lecture Number	Topics Covered	Chapters	Readings
September 2, 2014	1	Introduction, Syllabus, Signals	1	pp. 351-358
September 9, 2014	2	Signals, Sound Analysis	1	pp. 1-56
September 16, 2014	3	Psychophysical Methods, Signal Detection Theory, Thresholds	2	pp. 127-131, 57-66
September 23, 2014	4	Frequency Selectivity, Masking, and the Critical Band	3	pp. 67-94
September 30, 2014	5	Frequency Selectivity, Masking, and the Critical Band	3	pp. 94-125
October 7, 2014	6	Loudness	4	pp. 133-166
October 14, 2014	7	Loudness and Review	4	pp. 133-166
October 21, 2014	8	Exam 1		
October 28, 2014	9	Temporal Processing	5	pp. 196-202
November 4, 2014	10	Temporal Processing	5	pp. 196-202
November 11, 2014	11	Pitch	6	pp. 203-243
November 18, 2014	12	Spatial Hearing	7	pp. 264-281
November 25, 2014	13	Spatial Hearing	7	pp. 264-281
December 2, 2014	14	Pattern and Object Perception	8	pp. 285-312
December 9, 2014	15	Speech and Review	9	pp. 315-349
December 16, 2014	16	Exam 2		

LEARNING OBJECTIVES AND OUTCOMES
HESP 722: PSYCHOACOUSTICS

STUDENT NAME:

SEMESTER COMPLETED: Fall 2014

Number	Title	Exam/quiz Questions	Homework Assignments
B9	Principles, methods, and applications of psychoacoustics		
B7	Normal processes of speech perception		
B8	Normal aspects of auditory physiology and behavior		
B13	Knowledge of physical characteristics and measurement of acoustic stimuli		
B15	Principles and practices of research, incl. experimental design, statistical methods, and applications to clinical applications		
B16	Medical /surgical procedures for treatment of disorders affecting auditory and vestibular systems		

Method of assessment denoted by (*).

Verification of assessment denoted by checkmark.

The above-named student has successfully demonstrated mastery of these learning outcomes, through class lectures and discussion, in-class examinations, and homework assignments.

Date:

Matthew Goupell, Ph.D.
Faculty instructor