

Hearing and Speech Sciences 722: Psychoacoustics



Fall 2019
Tuesdays 3:30-6 PM
JMZ1224

Instructor: Matthew Goupell
Office: 0241 Lefrak (LEF) Hall
Office Hours: Fridays 12-2 pm and by
appointment
goupell@umd.edu
Email: goupell@umd.edu

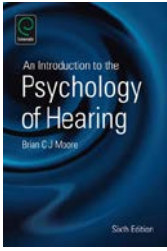
COURSE DESCRIPTION AND OBJECTIVES

The auditory system of the brain has evolved to process the world of sounds. It allows us to detect the 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 (usually 20-25 pts each): Exercises and/or questions on articles will be provided each week, and due the following week on Thursday at 3:30 pm.
- "Pop" Quizzes (10 pts each): There will be a **closed-book** pop quiz from time to time.
- 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 exercises, quizzes, a midterm exam, and final exam. Grades will be on an absolute scale for the following 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	Notes
August 27, 2019	1	Signals Review + CI signals, Psychophysical Methods, Signal Detection Theory	1	pp. 1-56, 127-131	1	
September 3, 2019	2	Thresholds and Temporal Integration	2	pp. 57-66, papers	2	
September 10, 2019	3	Frequency Selectivity, Masking, and the Critical Band	3	pp. 67-88	3	
September 17, 2019	4	Frequency Selectivity, Masking, and the Critical Band	3	pp. 88-125, papers	4	
September 24, 2019	5	Loudness	4	pp. 133-166	5	
October 1, 2019	6	Catch up and Review				
October 8, 2019	7	Exam 1				
October 15, 2019	8	Temporal Processing	5	pp. 169-189		
October 22, 2019	9	Temporal Processing	5	pp. 189-202, papers	6	
October 29, 2019	10	Pitch	6	pp. 203-243	7	
November 5, 2019	11	Spatial Hearing	7	pp. 245-266	8	Matt away; Kristina Milvae Lecturing
November 12, 2019	12	Spatial Hearing	7	pp. 266-281, papers	9	
November 19, 2019	13	Pattern and Object Perception	8	pp. 285-312	10	
November 26, 2019	14	<i>Class Choice</i> (listening effort, more binaural hearing, kiddie psychoacoustics, speech processing in HI listeners?)	9	pp. 315-349	11	
December 3, 2019	15	Catch up and Review	10	pp. 351-372		
December 10, 2019		Reading Day - No Class				
December 17, 2019	16	Final Exam				

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.

Copy write:

Class lectures and other materials 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 9, 2019**. 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 9, 2019**.

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 9, 2019**. 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. Practice makes perfect you know. Solutions will be posted sometime after the material is covered for a given chapter.

LEARNING OBJECTIVES AND OUTCOMES
HESP 722: PSYCHOACOUSTICS

STUDENT NAME:

SEMESTER COMPLETED: Fall 2019

Title	Exam/quiz/homework Questions	Achieved
A1. Genetics, embryology and development of the auditory and vestibular systems, anatomy and physiology, neuroanatomy and neurophysiology, and pathophysiology of hearing and balance over the life span	*	
A4. Principles, methods, and applications of acoustics, psychoacoustics, and speech perception, with a focus on how each is impacted by hearing impairment throughout the life span	*	

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.

Matthew Goupell, Ph.D.
Faculty instructor

Date: