

Hearing and Speech Sciences 722: Psychoacoustics



Fall 2021
Tuesdays 4:00-6:00 PM
JMZ1224

Instructor: Matthew Goupell
Office: 0241LEF
Office Hours: By appointment
Email: goupell@umd.edu

COURSE DESCRIPTION AND OBJECTIVES

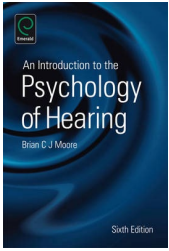
The auditory system of the brain has evolved to process the world of sounds. It allows us to detect the rustling of leaves that might signal the presence of a predator, to follow a friend's conversation in a loud and noisy bar, and to appreciate the subtlest of differences between melodies. Basically, 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, and auditory scene analysis.

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:

Required Text: Brian C. J. Moore, “An Introduction to the Psychology of Hearing” – 6th Edition
Emerald Group Publishing Limited, 2012

ISBN-13: 9781780520384

Optional Text: Brian C. J. Moore, “Cochlear Hearing Loss” – 2nd Edition

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

Class Format:

- This will be a flipped classroom.
- Reading the textbook and papers should be done before class.
- Lectures and recordings will be provided.
- Online quizzes will be provided, attempted before class, and will be due the Friday after the appropriate lecture.
- The in-class portion will be part discussion (questions about online exercises) and part presentations/discussion about papers from the literature. This portion is aimed to last about 2 hours (not the 3 hours shown on Testudo).

Quizzes and Exams:

- Online Exercises: There will be short online quizzes over each topic we cover for each chapter. Typically, they will be just a few points (~5-15) per topic. Online exercises can be redone as many times as you want, the last grade being kept.
- Paper Questions (3 pts each): Each student must post a question to the discussion board at least about each article by **Tuesday at noon**.
- Paper Exercises (~10-20 pts each): Each paper will require you to answer some online questions. These will typically require greater depth, thought, and effort than the online exercises. There are usually three papers to read per class: one typical hearing paper, one hearing impaired paper, and one cochlear-implant paper.
- Exams (200 pts each): A midterm and a final will be given. The final is cumulative.

Grading:

Your course grade will depend upon exercises, presentations, and exams.

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	Class Number	Topics Covered	Chapter	Textbook Readings (for this class)
August 31, 2021	1	Review of Syllabus, Class Overview		
September 7, 2021	2	Signals Review + CI signals, Psychophysical Methods, Signal Detection Theory	1	Ch 1, pp. 127-131
September 14, 2021	3	Thresholds and Temporal Integration	2	Ch 2
September 21, 2021	4	Frequency Selectivity, Masking, and the Critical Band	3	Ch 3
September 28, 2021	5	Frequency Selectivity, Masking, and the Critical Band	3	Ch 3
October 5, 2021	6	Loudness	4	Ch 4
October 12, 2021	7	Catch-Up, Questions, and Review		
October 19, 2021	8	No Class, Take-Home Exam 1 Due		
October 26, 2021	9	Temporal Processing	5	Ch 5
November 2, 2021	10	Pitch	6	Ch 6
November 9, 2021	11	Spatial Hearing (Sound Localization)	7	Ch 7
November 16, 2021	12	Spatial Hearing (Speech in Noise)	7	Ch 7
November 23, 2021	13	Pattern and Object Perception	8	Ch 8
November 30, 2021	14	Speech Perception, Listening Effort	9	Ch 9
December 7, 2021	15	Questions and Review		
December 14, 2021		<i>Reading Day - No Class</i>		
December 21, 2021	16	Take-Home Final Exam 2 Due		

Other important dates

Mon-Wed, Sept. 6-8, 2021 **Rosh Hashanah**

Sun-Mon, Sept. 15-16, 2021 Yom Kippur

Mon-Wed, Sept. 20-22, 2021 **Sukkot**

Mon-Wed, Sept. 27-29, 2021 **Simchat Torah**

Wednesday October 13 Electrophysiology Midterm

Monday October 25 Pediatrics Midterm

Sun-Mon, Nov 28-Dec 6, 2021 **Hanukkah**

Dear students,

***Important Point #1:** As you are well aware, this semester is still not normal. We may be dealing with additional stress and anxiety. I'm writing this to let you know that I am very open to being flexible should life events arise that make it hard for you to keep up with the class. Such events might include things happening to you personally or things happening to family members. Please know that I want to do everything I can to support you. To do this, though, I need to know about a problem when it starts, not after it has already derailed your ability to keep up with class. I don't need to know details. Whatever you are comfortable telling me is fine. Letting me know sooner rather than later, though, is key. I'm in a much better position to help you and make accommodations if you tell me when the problem arises. It is MUCH harder to do this if you wait until the end of the term. You can email me. Upshot: I am here to help. If you are having life issues that are making it hard for you to keep up with class, PLEASE let me know so I can help.*

***Important Point #2:** We have reached a new level of uncertainty of this semester. We will generally follow the advice of the University. For now, we will meet in person and we have returned to standard grading policies and deadlines. We will have a ripcord policy, to go back and change the syllabus as needed given circumstances. Changes won't be made lightly but they may be necessary given some circumstances. We will institute a democratic system and require a >2/3 majority vote on syllabus changes.*

Attendance:

- Attendance to class is not required in this class; however, it is highly encouraged because it will help you better understand the material and resolve questions.

Class Participation:

Class participation is highly encouraged.

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 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.

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 13, 2021**. 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 13, 2021**.

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 14, 2021**. I will reschedule the exam for the entire class to a more appropriate date.

LEARNING OBJECTIVES AND OUTCOMES
HESP 722: PSYCHOACOUSTICS

STUDENT NAME:

SEMESTER COMPLETED: Fall 2021

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: