Introduction

How does the human brain make sense of the acoustic world? What properties of sound are important for the discrimination and recognition of sounds with specific meaning? What aspects of auditory perception do humans share with other animals? How does the brain perform the computations necessary for skills such as sound localization? How do we focus our auditory attention on one voice in a crowd? What acoustic cues are important for speech perception? What’s special about music? We will address these questions and more by studying the basics of auditory perception in a textbook, and reading classic and current literature to understand the scientific progress in the field today. Our reading of the literature will be critical, with a focus on good scientific design.

This course will systematically review the main topics of auditory perception such as: 1) the physics of sound; 2) the anatomy and physiological functioning of the auditory system; 3) perception of loudness; 4) frequency selectivity and discrimination; 5) perceptual phenomena such as forward and backward masking; 6) temporal processing; 7) pitch and timbre perception in simple and complex sounds; 8) auditory attention; 9) scene analysis; 10) speech and music perception. We will examine the current literature on such topics as sound localization in humans and other animals, how the brain forms a map of auditory space, acoustic communication in humans, birds and other mammals, and how the brain may be specialized to encode the unique communication sounds of individual species. We will analyze the studies demonstrating categorical perception and lateralization of the brain for language processing. And we will study how people perceive and process music.
The reading list and weekly schedule


**Week 1 – Sept 10**

The physical properties of sound, the ear, the auditory system, functions of hearing, model systems in understanding auditory perception

**Reading**

Moore, chapter 1

Students select presentation topics this week

**Week 2 – Sept 17**

**Sound Intensity and Loudness Perception**

**Presenters:**

**Reading**

Moore, chapters 2 and 4


**Week 3 – Sept 24**

**Frequency Selectivity, Discrimination**

**Presenters:**

**Reading**

Moore, chapter 3 and first part (up to sec. 4) of chapter 6-


**Week 4 – Oct 1**

**Temporal Information and Processing**

**Presenters:**

**Reading**

Moore, chapter 5


**Week 5 – Oct 8**

**Sound Localization**

**Presenters:**

**Reading**

Moore, chapter 7


**Week 6 – Oct 15**

**Auditory Attention**

**Presenters:**

**Reading**


**Week 7 – Oct 22**

Midterm Exam

**Week 8 – Oct 29**

**Complex Sounds, Streaming and Scene Analysis**

**Presenters:**

**Reading**

Moore, chapters 6 and 8


**Week 9 – Nov 5**

Academic Holiday
**Week 10 – Nov 12**

**Speech and Categorical Perception**

*Presenters:*

Reading  
Moore, chapter 9


**Week 11 – Nov 19**

**Neural Basis of Speech Perception**

*Presenters:*

Reading


**Week 12 – Nov 26**

**Auditory communication in nonhuman animals**

*Presenters:*
Reading


**Week 13 – Dec 3**

**Music Perception**

**Presenters:**

**Reading**


**Week 14 – Dec 10**

**Neural Basis of Music Perception**

**Presenters:**

**Reading**


**THERE IS NO FINAL EXAM**

**Course requirements**

Professor Woolley’s permission to join the class is required. Attendance at the first day of class is required. Each week, students will participate in a two-hour seminar. Class time will be devoted to the presentation and discussion of book chapters and journal articles. The reading is intended to provide background knowledge on the relevant topics, to cover the current and most exciting research on those topics, and to serve as a stimulus for discussion. Two students sign up to lead the discussion each week.

**Grading**

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students take a written midterm exam with essay questions covering the material in the textbook, the papers and the class discussions.</td>
<td>20%</td>
</tr>
<tr>
<td>During the second half of the semester, each student writes a 10 page term paper on a topic that we choose together.</td>
<td>30%</td>
</tr>
<tr>
<td>Participation and Presentations</td>
<td>50%</td>
</tr>
</tbody>
</table>