

PSY 348: Music and the Brain

Spring 2018

last updated: April 2, 2018



Overview	What are the neural correlates of our perception of tonality, harmony, melody, and rhythm? How do these relate to acoustics, auditory neurobiology, perceptual grouping mechanisms, brain damage, and cognitive neuroscience?
Objectives	To develop the tools and knowledge to ask meaningful questions about music and the brain, how to frame these questions, and how one might attempt to answer them.
Description	<p>This course uses music as a unifying theme to introduce fundamental concepts and open questions in a broad range of approaches to brain science. Throughout the course, we explore music at several levels of analysis, ranging from individual notes to melody, harmony, and rhythm. In parallel, we ask how these different levels are processed by neurons, the brain, and the mind. We cover physical and mathematical descriptions of sound, including an introduction to acoustics, spectral analysis, and the frequency domain. We go over the neurobiology of the auditory system, including fundamental concepts and methodology in sensory and systems neuroscience. We will cover several key areas of cognitive psychology, including perceptual grouping, working memory, and mental imagery. Finally we cover several approaches to cognitive neuroscience, such as human brain imaging and the specific effects of brain damage. In all of these areas, we use music and our perceptual experience of music as a unifying framework. There are no prerequisites. This course satisfies the University Science Group Requirement. This course assumes no previous knowledge of music theory or neuroscience but will introduce basic concepts and methods relevant to these fields.</p>
Lectures	Tuesday & Thursday 4:00pm - 5:20 pm in Lawrence 177
Instructor	<p>Mike Wehr wehr@uoregon.edu office hours: Mondays 2:00-3:00 pm in 213 LISB or by appointment.</p>

Teaching Assistants	<p>Iryna Yavorska yavorska@uoregon.edu Office hours: Wednesdays 12-1 pm and Thursdays 10-11 am LISB Atrium, second floor. (ring the doorbell to 206 LISB if I'm not there)</p> <p>Netanya Beard netanya@uoregon.edu Office hours: Tuesdays 3-4 pm and Wednesdays 1-2 pm LISB Atrium, second floor. (ring the doorbell to 206 LISB if I'm not there)</p>
Textbook	none
Readings	<p>All course readings will be available on Canvas: https://canvas.uoregon.edu You should check Canvas frequently for announcements, etc.</p>
Optional Reading	<p>"This is your brain on music," by Daniel Levitin "Musicophilia," by Oliver Sacks Both are popular best-sellers and are available on Amazon, etc.</p>
Format	<p>Material is presented through a combination of lectures, in-class demonstrations, and assigned readings (estimated 2-4 hours per week). There are no discussion sections or laboratories.</p>
Discussion Board	<p>Can be used to interact with instructor and other students, and is available on Canvas. You may post anonymously.</p>
Plagiarism	<p>Is taken very seriously and is grounds for failure or expulsion. You are responsible for understanding what constitutes plagiarism and how to avoid it in your work. Excellent guides on plagiarism can be found at https://researchguides.uoregon.edu/citing-plagiarism and http://www.plagiarism.org. Term papers will be analyzed with plagiarism detection software.</p>
Expectations	<p>This is an upper division science course. This course will be difficult. The material is advanced and the pace will be fast. The exams will be very challenging. See what students have said about the level of difficulty of this course. Nevertheless, I expect that any student who does the readings, shows up to class, and asks questions should be able to master the material and succeed in the course. Typically, the top 20-25% students earn A's in the course.</p>

Grading

Midterm Exam	25%
Final Exam	25%
Project	20%
Problem Sets	20%
Clicker questions	10%
	100%

Exams

The midterm exam will be in-class, on Day 10 (see [Calendar](#) for exact date). It will be open book, open notes. You may use your laptop. A word of advice about the midterm exam: even though it is open book, you should still study to prepare for the exam. The exam will test your understanding of concepts, rather than memorization. You will not have time during the exam to read and understand all the material for the first time. The more familiar you are with the material, the easier and faster it will be to refer to it during the exam. The final will be a take-home exam, open book, open notes, will cover the material from the entire course, and will be available on Canvas after the last class (Day 20; see [Calendar](#) for exact date), and due by 5 p.m. on the following Monday (see [Calendar](#) for exact date).

Paper/Project

The paper, or project write-up if you choose to complete a project, should be 8-10 pages, double spaced, and is due at the beginning of class on Day 12 (see [Calendar](#) for exact date). Submit your paper through Canvas. Do NOT email your paper to the instructor or TAs. Emailed papers will not be accepted. The topic can be anything related to the course. A set of guidelines for project topics, format, expectations, etc. are posted on Canvas or also at <http://www.uoneuro.uoregon.edu/wehr/PaperProjectTopics.pdf>. You are strongly encouraged to read these guidelines carefully. Regardless of which topic you choose, you must submit the topic for approval by the night before Day 8 (submit as part of Problem Set 7).

Required Format for the paper:

- The filename should include your last name, for example: smith-psy348.doc.
- Include page numbers.
- Include a header with your name and a shortened title (~25 words or less).
- use .doc or .pdf

Problem Sets

You must do the assigned reading *before* each lecture. The day before each lecture, after you've completed the reading, you will need to log onto Canvas and complete the online Problem Set. These are required; they are due by 11:59 p.m. the night before each lecture, and count for 20% of your final grade in the course. Late problem sets will

not be accepted, and there are no make-ups. I will drop your 2 lowest-scoring Problem Sets, so don't worry if you miss one or if you added the course late.

The objectives of the Problem Sets are fourfold: (1) Lots of relatively easy points (if you've done the reading) distributed daily throughout the term. This takes some pressure off the exams, in case you have a bad exam day. (2) Motivation to do the reading, show up to class, and pay attention. (3) Review concepts and material to help prepare for the exams. (4) Constant feedback to me about how much you're understanding, and what concepts need more emphasis in class.

Clicker Questions

We will use iClickers for answering in-class questions to review topics and encourage participation. iClickers are available for purchase at the UO Bookstore. You must register it to your Canvas account: log on to Canvas and select i>Clicker from the left panel, and fill out the form with your name, Duck ID (this is your username, NOT your student ID number), and the clicker ID number located on the back of the clicker. I recommend that you put a piece of clear tape over the ID number so that it doesn't rub off. Please remember to bring your iClicker to class. Clicker questions will count for 10% of your total grade. Each day, about half of the clicker points are awarded regardless of whether you get the answers correct, as long as you attempt to answer at least 75% of the questions. The remaining half of the clicker points are awarded for correct answers. I will drop your two lowest-scoring days of Clicker points, so don't worry if you forget your clicker once or twice. The objectives of the Clicker questions are exactly the same as those for the Problem Sets.

Laptops Policy

Laptops are permitted during lecture only for taking notes. Please do not multitask. Please do not use Facebook, check your email, etc., which is visually distracting to other students behind and around you, and disrespectful to the rest of the class.

Schedule

These topics and dates often change quite a bit throughout the term, please see the Calendar in the first Module of Canvas for the latest schedule. The topics and schedule below will likely get out of date.

note: "Chapter X" refers to Music and the Brain Chapters. All readings are on Canvas

Day 1. Music and the Brain
Reading: Chapter 0 (Preface)

Day 2. Musical Space
Reading: Chapter 1

Day 3. Perception of Tones
Reading: Chapter 2

Day 4. Consonance and Dissonance 1
Reading: Chapter 3

Day 5. Consonance and Dissonance 2
Reading: Thompson, "Music of the Hemispheres"

Day 6. Melody and Harmony
Reading: Chapter 4

Day 7: Rhythm
Reading: Chapter 5
Paper topics due tomorrow

Day 8. The Ear
Reading: Chapter 6

Day 9. Neurobiology of the Auditory System 1
Reading: Chapter 7

Day 10. Midterm exam in class

Day 11. Neurobiology of the Auditory System 2
No reading

Day 12. Music Across the Lifespan
Reading: Chapter 8, and He & Trainor, 2009 "Finding the pitch of the missing fundamental in infants"
Papers due (in Assignments on Canvas)

Day 13. Grouping mechanisms in music

Reading: Chapter 9

Day 14. Brain damage and brain activity in music

Reading: Chapter 10

Day 15. The topography of tonality

Reading: Chapter 11, and Janata, "The cortical topography of tonal structures underlying Western music"

Day 16. Earworms and Musical Imagery

Reading: Chapter 12

Day 17. Music and the Emotional Brain

Reading: Chapter 13

Day 18. Birdsong

Reading: Chapter 14

Day 19. Musical Hallucinations

Reading: Chapter 15, and Zimmer, "Neuron network goes awry, and brain becomes an iPod"

Day 20. Music Therapy

Reading: Chapter 16

Final exam becomes available

Final exam due by 5 p.m. on the Monday following Day 20 (see Calendar for date).