

PSY 348: Music and the Brain

Winter 2014

last updated: December 28, 2013



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	<p>Monday & Wednesday 8:30–10:00 AM in HEDCO 146 Lecture notes are available on Blackboard before the lecture, you are encouraged to print them out and bring them to class for taking notes.</p>
Instructor	<p>Mike Wehr wehr@uoregon.edu office hours: Mondays 2:00-3:00 pm in 213 LIB or by appointment.</p>

Teaching Assistant	Iryna Yavorska iryna.yavorska@gmail.com Office hours: TBA probably LISB 217
Textbook	none
Readings	All course readings will be available on Blackboard: https://blackboard.uoregon.edu You should check Blackboard frequently for announcements, etc.
Optional Reading	"This is your brain on music," by Daniel Levitin "Musicophilia," by Oliver Sacks Both are popular best-sellers and are available at the bookstore in the textbook section for PSY 348.
Format	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.
Discussion Board	Can be used to interact with instructor and other students, and is available on Blackboard. You may post anonymously.
Plagiarism	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 http://libweb.uoregon.edu/guides/plagiarism/students/ and http://www.plagiarism.org . To help educate students about what constitutes plagiarism, in this course we will be using a plagiarism education blackboard plugin to submit term papers.
Expectations	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.

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 Blackboard 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 the Assignment on Blackboard. 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 Blackboard or also at <http://www.neuro.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 Blackboard 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 Blackboard account: log on to Blackboard, go to Course Documents, select iClicker Registration, 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.

Schedule

These topics and dates often change quite a bit throughout the term, please see the Calendar in the Course Documents section of Blackboard 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 Blackboard

Day 1. Music and the Brain
No reading

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. MLK, no class

Day 6. Consonance and Dissonance 2
Reading: Thompson, "Music of the Hemispheres"

Day 7. Tonality
Reading: Chapter 4, and Machlis & Forney, "The Organization of Musical Sounds"
Paper topics due tomorrow

Day 8. The Ear
Reading: Chapter 5

Day 9. Neurobiology of the auditory system 1
Reading: Chapter 6

Day 10. Midterm exam in class

Day 11. Neurobiology of the auditory system 2
No reading

Day 12. Rhythm
Reading: Chapter 7
Papers due (in Assignments on Blackboard)

Day 13. The Missing fundamental in infants

Reading: Chapter 8, and He & Trainor, 2009 "Finding the pitch of the missing fundamental in infants"

Day 14. Grouping mechanisms in music 1

Reading: Chapter 9, and Deutsch, "Grouping Mechanisms in Music"

Day 15. Grouping mechanisms in music 2

No Reading

Day 16. Brain damage and brain activity in music

Reading: Chapter 10

Day 17. No Class

Day 18. The topography of tonality

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

Day 18. Musical Imagery

Reading: Halpern, "Cerebral substrates of Musical Imagery"

Day 19. Songbirds

Reading: Brenowitz, "An Introduction to Birdsong and the Avian Song System"

Day 20. Musical Hallucinations

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

Final exam becomes available

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