Topic proposal due: Monday April 20th, 12 pm (along with problem set 6, plan ahead for this).

Final paper due: Wednesday May 20th, 12 pm (along with problem set 13, plan ahead for this).

Length: As a rough guideline, the paper, or project write-up if you choose to complete a project, should be about 8-10 pages, double-spaced. There is not a strict page limit or page requirement; rather, this describes the level of depth that I expect. Much shorter than that, and I doubt you will be able to adequately address your topic. Much longer than that, and you could probably condense your writing or limit your scope.

Style: It doesn't matter what format for style (APA, MLA, etc. just be consistent). The tone can be scientific or journalistic (e.g. personal voice). Good writing and good organization are very important.

Submission: Submit your paper through Assignments on Canvas. If there are technical issues uploading to Canvas (e.g. your files are too large, do try to condense or compress them and try again. As a last resort, email your project to <u>dr.karns.courses@gmail.com</u>. Do not send files/attachments to my uoregon address.

- 1. The filename should include your last name, for example: smith-348-termpaper.pdf
- 2. Include page numbers
- 3. Include a header with your name and a shortened title (~25 words or less)

Do you struggle with your writing? The teaching and learning center is a great resource available to you. <u>http://tlc.uoregon.edu/subjects/writing/</u>

Be creative. Be original. Make new connections.

On the first day of class I explained my objectives for this course and the topics we will be covering. I hope the fundamental knowledge you gain in this course will give you the tools to explore, ask questions, and make connections between the many fascinating concepts about music and the brain. There are so many amazing questions that we will only touch on briefly if at all, due to time constraints. Now is your chance to dive deeper into something that captures your interest. For example, you might take an idea, question, or piece of music that we touched on only briefly in class, but that you found intriguing. Explore and develop that spark of interest into a **well-posed question** that can be answered or explored using the concepts we are covering in this class.

This question will be the backbone of your paper. Make sure it is very clear what your question is. Then set out to try to answer that question as best you can, using any of the following approaches:

- research into published materials (e.g. about 5-10 scientific studies, books, reviews)
- a psychology experiment of your design (run subjects, present results, see me for human subject guidelines for class research)
- psychological or neuroscience analysis using data from other sources (e.g. online repositories)
- music theoretic analysis of a piece of music or genre of music
- signal processing analysis (math on music)
- or whatever combination of tools you can bring to bear on your question.

Your topic can relate to any aspect of music, but should also span at least one other area covered in this class (e.g. physics of sound, acoustics, consonance/dissonance, tonality, auditory perception, neurobiology of auditory system, brain damage, imagery, etc.).

A good rule of thumb for whether your idea fits within the scope of the class: would you be able to write this paper if you weren't taking this class?

For example, a paper analyzing the emotional effect of lyrics should bring in an additional scientific concept from the class. For example, one could discuss the effect of right versus left hemisphere brain damage on the

emotional effect of lyrics. A paper on cross-cultural comparisons of musical styles could analyze the frequency components of different vocal styles. Take full advantage of getting feedback on your paper topic by putting your best effort into clearly and succinctly describing your topic proposal. Your topic is due April 20th, the final paper is due May 20th. Ask for additional feedback; we are happy to help.

Have fun and use this assignment to learn more about something you are curious about. For example, you could use some audio software to illustrate your ideas. You could design an experiment and run some friends (check with me about human subjects ethics for class project research first). Make your point by performing your instrument and recording it. Be creative, find a topic you can get enthusiastic about, and then let that enthusiasm show in your work.

Examples:

A. That 5/4 meter in "Take Five" by the Dave Brubeck Quartet is so catchy. Why is that? What would an analysis of the metrical structure look like for that piece? Maybe someone has done it...Google it up. Is there an alternation of expectation and violation in that meter, and does that relate to how catchy it is? Would we be able to see that happening by recording neural activity in the auditory system, or some other part of the brain? Do all 5/4 pieces have that effect? What genres does that meter show up in? Do such pieces tend to express the same kinds of emotions? Could you play that piece in 4/4 time, and would it sound as catchy? Try it! Record it and include the mp3 in your project report (it's easy to embed audio or video into word processing or Powerpoint documents — see below for instructions). Don't play sax? You could demonstrate the main effect on your roommate's oboe instead, have a pal play it, or work it up digitally.

B. Analyze your favorite song. Compute its spectrogram and use it to relate features from the spectral, harmonic, or rhythmic structure to musical aspects of the song. There are several good signal analysis programs that you can download for free. What features do you find interesting, catchy, pleasant or unpleasant, and why? How are meaning and emotion conveyed? How are the acoustic or musical aspects you've identified processed in your brain? Refer to other sources to try to answer these questions.

Getting Started:

You could find a cool journal article to get you started. You could go to the Music Library on the third floor of the Knight Library, or go to the Science Library, or browse online. "Cerebral Cortex", "The Journal of Neuroscience," "Music Perception," or "Psychology of Music." are great journals to start with, but there are many more. Pick an article that interests you, and read it. Then read another article by a different author on a related topic (the references of the first article would be a good place to look). Compare and contrast the articles: Why did they do these experiments? How are their results related? Do their results agree? Why or why not? Which methodology is better, or are they both flawed? What experiment should they do next, and why?

Figure out what the next step should be in the series of experiments that have been done, and propose an experiment that can address that next step. This could be a real, doable experiment, or what is sometimes more fun is to imagine impossible thought experiments. If you could record from every neuron in the brain, what might you expect to see? What could you learn? Where are the real limitations in current understanding?

Find an issue on which some authors disagree. Controversies always make for a rousing paper, you can lay out the characters and their positions, build suspense, root for the underdog, etc.

A vanilla review paper can still be fun to write (and to read) if you try to personalize it - Why did you start researching this topic? What were you hoping to find out more about? What did you learn and how does that relate to what motivated you in the first place?

Diana Deutsch put together an off-the-shelf music psychology experiment package based on the tritone paradox. You can download the stimuli and the methods for running subjects and analyzing the results from Blackboard/Course Documents/Auditory demonstrations/Diana Deutsch/Musical Illusions and Paradoxes. There's no creativity required to simply follow the instructions, so what will make this project interesting is comparing the results across several subjects. You might also want to think about a better data presentation format than that chosen by Deutsch. Can you think of other ways to add your creative contribution to an otherwise canned project?

Here are some topics or titles of term papers from previous years:

- An experiment testing how music predicts emotional responses in movies
- Personality Type and Musical Taste
- A study of the intrigue behind the song, "Paranoid Android" by Radiohead
- Analysis of "Girl, You have no Faith in Medicine"
- Music and Emotions
- Perception of the Perfect 5th by Infants
- Effect of Music on Work Performance
- Working Memory and Tonal Patterns
- A Brief Look at the Sounds of Miles Davis
- Synesthesia
- Neurological correlates of perfect pitch
- Déjà Vu: An Analysis
- Frequency characteristics of Distortion Pedals
- Differences in Perception Between Atonal and Tonal Music
- The Magic of Meter
- Musical savants
- Music perception in animals compared to humans
- Musical hallucinations
- Music therapy

- Perfect pitch
- Atonal music
- Beatlemania
- Analyzing music holistically or in parts
- Distortion pedals
- Brain plasticity in musicians
- Development of music perception in children
- Effects of music on the elderly
- The Mozart effect and other effects of music on test performance
- Music Perception in Individuals with Cochlear Implants
- Music and Speech
- Gender's different emotional relationship to Music: Is there a Difference?
- Autism and Musical Perception
- A Psycho-musical Analysis of "The Scientist" by Coldplay
- Music Therapy in the Elderly
- The Mystery of Musical Hallucinations
- Pitch Perception in Musical and Nonmusical Savants
- Atonal music

Grading Criteria:

No matter how cool or interesting your project or paper, it must be well organized, clearly written, and grammatically correct. To get an idea of what criteria I will use to assess your writing, here are some of the guidelines I like to use:

Chris Mayda's term paper grading criteria (http://www.neuro.uoregon.edu/wehr/gradingcriteria.html) http://new.trc.virginia.edu/Publications/Teaching_Concerns/Fall_1996/TC_Fall_1996_Caraco.htm

As with any paper, the reader should be able to quickly get a clear idea of **the question you are asking** just by reading the title and perhaps the first few sentences. By the end of the paper, the reader should have a clear idea of the answer to your question, and how you arrived at that answer. Don't leave it to the reader to connect all the dots; that's your job as a good writer.

Make an outline before you start writing to help you lay out the organization of the paper in a coherent and logical way. Include an introductory paragraph that explains the organization so the reader knows what's coming. Use section headings to help the reader understand how the paper is organized. Use transitional sentences so that the reader can anticipate what comes next. Good transitions to make your logic flow over the course of the paper and keep the reader engaged.

Technical Resources:

Here are some programs for computing and visualizing spectrograms that can be freely downloaded: <u>http://www.visualizationsoftware.com/gram.html</u> (for PC) <u>http://www.faberacoustical.com/products/signalscope/</u> (for Mac) <u>http://www.speech.kth.se/wavesurfer/download.html</u> (all platforms) Audacity is a free application for editing and converting sound file formats (for example, from mp3 to wav). <u>http://audacity.sourceforge.net/</u> (all platforms)

Some of these programs can either read audio files from your hard disk, or with some (on many computers) you can plug your iPod or CD player right into your soundcard. Students who used them in previous years said most were simple, efficient and helped in solidifying aspects of the class.

If you're interested in using spectrograms, be aware that there are limits to what a spectrogram can reveal about a song. Most music is so dense and complex that the spectrogram just looks like a mess to the naive user. Usually not much more than the beat or verse-chorus-verse structure is obviously visible. You'll probably have the best luck with spectrally or temporally very simple songs, or very short segments. For example, a great project from a previous year was to compare the spectrogram of "Hide and Seek" by Imogen Heap (a simple *a capella* song with lots of electronic vocal processing) with the same song performed by an *a cappella* group without any electronic processing.

For an example of a musical analysis of a song, take a look at John Stevens' take on Hard Days Night. You should go beyond this simple format. http://www.berkleeshares.com/download/760681/berklee_hard_days_night_analysis.pdf

You don't need to be constrained by the limits of a text document. You can embed sound files directly into a word processing document in Word using the Insert menu (for detailed instructions in Word, Google "how to insert a sound in word;"). You can create a multimedia project that includes sound, graphics, or animation in addition to text (e.g. Powerpoint or a video) and include it along with your paper. Impress, a free open-source alternative to these programs, is available at openoffice.org. Don't forget to properly attribute the sources of any sounds or images that you use.

Avoiding plagiarism.

Scientists and scholars use each others' ideas all the time, and reuse what they have said (even using the exact words, if they've expressed an idea particularly well). There are rules and structures in place for how to use an idea without claiming it as your own; what's important about attribution is not so much how you cite your references or whether you include a complete bibliography, but that you do it at all. 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://libweb.uoregon.edu/guides/plagiarism/students/,

Your paper will be checked for plagiarism against a database of millions of student papers, periodicals, journals, publications, as well as the entire internet. You should cite the sources not just for direct quotes but any idea or result that is not originally yours. Remember, what is wrong is to represent someone else's words, thoughts, or ideas as your own — in other words, taking credit for someone else's work.

A word about Wikipedia. While it's a great resource, you should remember that it is anonymously edited and updated, and therefore can be unreliable and subject to bias, deceit, and factual errors. Feel free to use Wikipedia, but in most cases it's a good idea to check your facts with more reliable scholarly sources. I think of Wikipedia as a starting point rather than as the final factual reference. If you do cite Wikipedia (which is fine), be sure to cite the specific page rather than just "Wikipedia." Better yet, follow up on the sources used in the Wikipedia page to try to find the original source.

On that note, thanks to Mike Wehr for use of his guidelines from previous years as a basis for these revised guidelines for 2015!