

# Music 227/228: Introduction to the Perception and Cognition of Music

## Carleton College, Spring 2021

**Instructor:** Justin London  
**Phone:** x4397;

**Office:** WCC M208  
Hours Mon. 1:30-3:00 (PM)  
Tues. 8:30-10:00 (AM)

### Course Materials

Recommended Text (not required): Diana Deutsch, ed., *The Psychology of Music*, 3d edition (2012), Academic Press

All Materials, mp3 files, PDFs, etc., on the course Moodle page.

### What is Music 227 about?

There is a long and vibrant program of research in auditory perception and cognition which goes back to the 19th century, and good part of it involves music, either as a stimulus of choice and/or as the object of study. This research can tell us a good deal about how and why music (even music from very different times and/or places) sounds and affects us the way it does, as our ears and brains impose fundamental constraints on musical structure. For example, the choice of tones in the construction of a musical scale is limited by the ways we perceive and categorize pitches, as well as by the limits of our ability to discriminate between them, which is why there are strong similarities between the musical scales used in different cultures. This course is an introduction to this research, with an emphasis on the perception of musical pitch (melody and harmony), though we will also look at rhythm and cross-modal perception, musical timbre and ecological perception, deficits in music perception and cognition (which will serve as an introduction to musical neuroscience), and emotional responses to music.

### Who is this class for?

Music 227 is aimed at both music students with little or no background in psychology, as well as psychology or biology/neuroscience students with little or no formal training in music. The goal of the course is to introduce you to both disciplines and enable you to understand current research in music psychology.

### What will we do in class?

In this class we will work through the perception and cognition of the basic parameters of music: pitch, melody (successive pitches) timbre, rhythm, harmony (simultaneous pitches), and tonality. We will also look at issues of auditory memory, embodied cognition, enculturation and learning, musical abilities and disabilities, and music and its relation emotional expression and arousal. Our work in class will compliment our activities in the lab section of the course, and in some cases will supplement the lab lectures. See the syllabus for class-by-class details, and the attached reading list.

### Course Assessment

- Two Midterm Exams (30% each): Weekend take-home exams given in the 4th and 7th weeks.
- Final Exam (40%): Take-home exam, due at the end of the examination period.

**Music 227/228: Introduction to the Perception and Cognition of Music**  
**Carleton College, Spring 2021**

**SYLLABUS OF LECTURES AND CLASS ACTIVITIES**

<b>Date</b>	<b>Topic</b>	<b>Materials</b>	<b>Sources/Readings</b>
3.29	Intro to Course; 3 Worlds	Beethoven and Gagaku	Butler; Popper
3.31	Musical Rudiments 1	Musical Examples	JML Handout/PDF
4.02	Musical Rudiments 2	Musical Examples	JML Handout/PDF
4.05	Psycho-Acoustics; Detection Theory	JND and Threshold Examples	Boring
4.07	The Physiology of the Ear	Cochlear Demonstrations	Gray; Mather
4.09	The Perception of Pitch	ASA Pitch Demonstrations	Oxenham; Fletcher
4.12	Relative Pitch and Mistuning	Auto-tune fails	Larrouy-Maestri
4.14	Musical Abilities: AP	Do you have perfect pitch?	Levitin, Ward
4.16	Gestalt Perception	Auditory Streaming Demos	Bregman
4.19	Timbre: Source Identification	A Wide Range of Sounds	McAdams et al., Clarke
4.21	Timbre and Memory: Plink	Song Identification Demo	Krumhansl
4.23	<b>Midterm #1</b>		
4.26	Rhythm: Beats and Entrainment	Groovy Music Examples	London; Janata et al.
4.28	Cross-Modal Perception of Tempo	Speed on the Dance Floor	London et al.
4.30	Statistics Boot Camp	Peer presentations on Stats	TBA
5.03	<b>Midterm Break</b>		
5.05	Memory	Memory for Tunes and Digits	Bower; Snyder
5.07	Pathological Memories: Earworms	Songs You Can't Forget	Halpern & Williamson &
5.10	Introduction to Harmony	Famous Chord Progressions	JML Handout
5.12	Tonality: Frameworks for Pitch	Krumhansl & Kessler Demo	Krumhansl & Kessler
5.14	Musical Inabilities: Amusia	Test for Amusia	Peretz et al.
5.17	Musical Inabilities: Beat Deafness	The Beat Alignment Test	Phillips-Silver et al.
5.19	THIS CLASS INTENTIONALLY LEFT BLANK (catch-up; pre midterm questions, etc.)		
5.21	<b>Midterm #2</b>		
5.24	Theories of Musical Emotion	Emotional Description Test	Juslin & Sloboda
5.26	Emotional Cues in Music	Loud Noises and Sweet Songs	Lahdelma & Eerola
5.28	Presentations I		
5.31	Presentations II		
6.02	Presentations III; Course Wrap-up		

**FINAL EXAMS Due 5:00 PM, Monday June 7th.**

**Music 227/228: Introduction to the Perception and Cognition of Music**  
**Carleton College, Spring 2021**

**Course Readings**

1. Butler, D. (1992). "Introduction" from *The Musician's Guide to Music Perception and Cognition*. New York: Schirmer Books: 1-14.
2. Popper, K. (1978). "Three Worlds." The Tanner Lecture on Human Values, the University of Michigan, April 1978.
3. Boring, E. G. (1942). *Sensation and Perception in the History of Experimental Psychology*. New York: D. Appleton-Century Co.: 3-18; 34-45.
4. Gray, L. Chapter 12: Auditory System: Structure and Function, in *Neuroscience Online*, John H. Byrne, Editor. <http://neuroscience.uth.tmc.edu/s2/chapter12.html>
5. Mather, G. (2006). "The Physics and Biology of Audition." *Foundations of Perception*. New York: Taylor & Francis (2006): 81-100, 120-127.
6. Fletcher, H. (1924). The Physical Criterion for Determining the Pitch of a Musical Tone. *Physical Review, Series II*, 23.3: 427-437.
7. Oxenham, A. (2013). "The Perception of Musical Tones." In *The Psychology of Music*, 3d Edition, Diana Deutsch, Ed. New York: Academic Press: 1-34.
8. Larrouy-Maestri, P. (2018). I know it when I hear it: On listeners' perception of mistuning. *Music & Science* 1: 1-17.
9. Levitin, D. J. (1994). Absolute Memory for Musical Pitch: Evidence from the Production of Learned Melodies. *Perception & Psychophysics* 56.4: 414-423.
10. Ward, W. D. (1999). "Absolute Pitch" in *The Psychology of Music*, 2nd ed. Ed. Diana Deutsch. San Diego: Academic Press: 265-298.
11. Bregman, A. (1990). *Auditory Scene Analysis: The Perceptual Organization of Sound*. Cambridge, MA: MIT Press: 1-45.
12. McAdams, S., & Giordano, B. L. (DATE) "The Perception of Musical Timbre" in *The Oxford Handbook of Music Psychology*, S. Hallam, I. Cross, & M. Thaut, eds. Oxford: Oxford University Press: 72-80.
13. Clarke, E. F. (2005). "Perception, Ecology, and Music." in *Ways of Listening*. New York: Oxford University Press: 17-47.
14. Krumhansl, C. (2010). Plink: 'Thin Slices' of Music. *Music Perception* 27.5: 337-354.
15. London, J. (2012) "Meter as a Kind of Attentional Behavior" and "Relevant Research on Rhythm Perception and Production." Chapters 1 and 2 of *Hearing In Time: Psychological Aspects of Musical Meter*, 2nd Edition. Oxford: Oxford University Press: 9-47.
16. Janata, P., Tomic, S., and Haberman, J. (2012). "Sensorimotor coupling in music and the psychology of the groove." *Journal of Experimental Psychology. General* 141(1): 54-75.
17. London, J., Burger, B., Thompson, M., and Toiviainen, P. (2016). Speed on the Dance Floor: Auditory and Visual Cues for Musical Tempo. *Acta Psychologica* 164: 70-80.

**Music 227/228: Introduction to the Perception and Cognition of Music**  
**Carleton College, Spring 2021**

18. Bower, G. H. (2000). "A Brief History of Memory Research." In *The Oxford Handbook of Memory*, Tulving & Craik, Eds. Oxford: Oxford University Press: 3-32.
19. Snyder, B. (2009). "Memory for Music." In *The Oxford Handbook of Music Psychology*, Ed. Hallam, Cross, & Thaut. Oxford: Oxford University Press: 107-118.
20. Halpern, A. R., & Bartlett, J. C. (2011). "The persistence of musical memories: A descriptive study of earworms." *Music Perception* 28(4): 425-432.
21. Williamson, V., & Jakubowski, K. (2014). Earworms. In *Music in the Social and Behavioral Sciences: An Encyclopedia*, W. F. Thompson, ed. (online).
22. Krumhansl, C., & Kessler, E. (1982). "Tracing the Dynamic Changes in Perceived Tonal Organization in a Spatial Representation of Musical Keys." *Psychological Review* 89: 334-68
23. Peretz, I., Champod, A. S., and Hyde, K. (2003). Varieties of Musical Disorders: The Montreal Battery of Evaluation of Amusia. *Annals of the N.Y. Academy of Sciences* 999: 58-75.
24. Phillips-Silver, J., et al. (2011). Born to dance but beat deaf: A new form of congenital amusia. *Neuropsychologia* 49(5): 961-969.
25. Iversen, J., & Patel, A. (2008). The Beat Alignment Test (BAT): Surveying beat processing abilities in the general population. *Proceedings of the 10th International Conference on Music Perception and Cognition (ICMPC 10)*. Sapporo, Japan.
26. Juslin, P., & Sloboda, J. (2013). "Music and Emotion." In *The Psychology of Music*, 3d Edition, Diana Deutsch, Ed. New York: Academic Press: 583-645.
27. Lahdelma, I., & Eerola, T. (2016). Single chords convey distinct emotional qualities to both naïve and expert listeners. *Psychology of Music* 44.1: 37-54.
28. Schutz, M. (2017). Acoustic Constraints and Musical Consequences: Exploring Composers' Use of Cues for Musical Emotion. *Frontiers in Psychology* 8:1402. doi: 10.3389/fpsyg.2017.01402

# Music 227/228: Introduction to the Perception and Cognition of Music

## Carleton College, Spring 2021

### Lab Course (MUSC 228) Information

#### Course Materials

Required Text: *Research Methods in Psychology*, 4th edition. Jhangiani, Chiang, Cuttler, & Leighton (2019). Open source publication; PDF on course Moodle Page.

Additional Materials: mp3 files, Excel files, and PDFs on the course Moodle page..

#### What we will do in this Lab

The goal of this course is to learn how to design and run a musical experiment, and then be able analyze and interpret the data gathered through it. The core activity involves teams of 3-4 students, each team recreating a classic experiment in music perception and cognition with a twist: in each we will vary the stimuli or conditions slightly, and compare our results with the original research. In order to do this, we will:

- Explore the special issues involved with participants in musical experiments
- Learn about the design of psychophysical experiments in general and music perception experiments in particular, with an emphasis on the role of auditory memory
- Create stimuli for music experiments by learning how to compose/create useful musical stimuli
- Learn how to organize and manage experimental trials, participants, data collection, and other relevant logistics
- Analyze our data using appropriate descriptive and inferential statistics
- Present our experiment and its results in oral and written form.

Weekly activities are given on the syllabus on the opposite side of this page.

#### Organization of the Lab Teams

Research in music perception and cognition is inherently interdisciplinary—each member of a research group brings her or his particular strengths and backgrounds (a knowledge of acoustics, neuroscience, of music theory, of statistics, of experimental design, etc., etc.). Yet it is essential that all members of the group know enough of each other's specialty so they can work together. We will do the same here, and to that end, you will be assigned both to a team and to a particular project, with the aims of (a) having complimentary backgrounds in each group, and (b) matching the particular strengths of a group to a given project. This will be done on the basis of the musical, stats, and psych background survey you filled out before the start of the term. Team assignments are non-negotiable.

#### Course Assessment

- |   |     |
|---|-----|
| • Weekly Assignments, including individual and partner assignments  | 35% |
| • Experimental Project (group project)  | 25% |
| ○ This includes literature review, preparation of stimuli, running experimental trials, data analysis, and a summary of results |     |
| • Experimental Participation (may be substituted by a paper)  | 15% |
| • Oral/Poster presentation of your Experiment (group project)   | 10% |
| • Individual write-up of your Experiment  | 15% |

Lab assignments are due 48 hours after the completion of your lab section (so, Thursday afternoon at 5:00 for Tuesday Lab; Friday afternoon at 5:00 for Wednesday Lab). Oral Presentations will take place in M-W class at the end of the term. Individual write-ups of your experiment are due 5:00 pm, Monday, June 5th.