

# The Science and Psychology of Music

PSYC 3266 | SPRING 2023 | FRIDAYS, 1:30PM-3:30PM | TBD  
COURSE WEBSITE

## Instructor

Mayron Piccolo, PhD

## Email

[mpiccolo@fas.harvard.edu](mailto:mpiccolo@fas.harvard.edu)

## Office hours

By appointment

## COURSE DESCRIPTION & GOALS

Music is an important ally when we feel like celebrating and when we are feeling down. It can distract us, make us forget or remember things more easily. Why do songs like “The Scientist” give us a sad vibe while songs like “I Got a Feeling” set the stage for a fun night ahead? Is music training like *CrossFit for the brain*? How can music engagement (i.e., passive listening or active making of music) support well-being? In this course, we will explore how music modulates our thoughts, feelings, and behaviors through the lens of psychological science. We will look at how the brain experiences music and the impact of music and musical training on brain plasticity throughout different stages of development. Finally, using empirical research and case studies, we will discuss how music is applied to daily life and how it has benefited premature babies, individuals with mental disorders (such as depression), as well as conditions, such as Alzheimer’s disease and Parkinson’s disease.

Throughout the course, you will be equipped to:

- Discuss how music and emotions interact.
- Discuss the effects of music training on cognition.
- Discuss benefits of music engagement throughout one’s lifespan.
- Understand how music can support positive mental and physical outcomes.
- Critique popular articles using empirical studies.
- Communicate the science and psychology of music to the general population.
- Provide meaningful feedback to peers on the communication of the science and psychology of music.

## Role in the Curriculum

This seminar is designed for undergraduates majoring in Psychology or Neuroscience & Behavior, and for students participating in the Psychology Post-Baccalaureate Certificate program. It fulfills the following degree requirements:

- For the Psychology major or concentration in Columbia College and in the School of General Studies, and for the Psychology Post-Baccalaureate Certificate program, this course will meet the Group 1 (Cognition & Perception) distribution requirement.
- For the Neuroscience and Behavior joint major, it will fulfill the Psychology requirement for an advanced psychology seminar.
- For Psychology Post-Baccalaureate students and for Psychology majors, it will fulfill the seminar requirement.

## Course Program

**01/20/23**

### **Music as part of the human experience**

Trehub, S. E., Becker, J., & Morley, I. (2015). Cross-cultural perspectives on music and musicality. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 370(1664), 20140096. <https://doi.org/10.1098/rstb.2014.0096>

Tan, S.L., Pfordresher, P., & Harré, R. (2010). Perception of musical pitch and melody. In *Psychology of Music: from sound to significance* (73-93). Psychology Press, NY.

**01/27/23**

### **Your brain on music**

Warren J. (2008). How does the brain process music? *Clinical Medicine (London, England)*, 8(1), 32–36. <https://doi.org/10.7861/clinmedicine.8-1-32>

Abrams, D. A., Ryali, S., Chen, T., Chordia, P., Khouzam, A., Levitin, D. J., & Menon, V. (2013). Inter-subject synchronization of brain responses during natural music listening. *The European Journal of Neuroscience*, 37(9), 1458–1469. <https://doi.org/10.1111/ejn.12173>

Hyde, K. L., Lerch, J., Norton, A., Forgeard, M., Winner, E., Evans, A. C., & Schlaug, G. (2009). The effects of musical training on structural brain development: a longitudinal study. *Annals of the New York Academy of Sciences*, 1169, 182–186. <https://doi.org/10.1111/j.1749-6632.2009.04852.x>

Koelsch S. (2014). Brain correlates of music-evoked emotions. *Nature Reviews. Neuroscience*, 15(3), 170–180. <https://doi.org/10.1038/nrn3666>

**02/03/23**

### **Music and emotions**

Hailstone, J. C., Omar, R., Henley, S. M., Frost, C., Kenward, M. G., & Warren, J. D. (2009). It's not what you play, it's how you play it: timbre affects perception of emotion in music. *Quarterly Journal of Experimental Psychology (2006)*, 62(11), 2141–2155. <https://doi.org/10.1080/17470210902765957>

Cowen, A. S., Fang, X., Sauter, D., & Keltner, D. (2020). What music makes us feel: At least 13 dimensions organize subjective experiences associated with music across different cultures. *Proceedings of the National Academy of Sciences of the United States of America*, 117(4), 1924–1934. <https://doi.org/10.1073/pnas.1910704117>

Xue, C., Li, T., Yin, S., Zhu, X., & Tan, Y. (2018). The influence of induced mood on music preference. *Cognitive Processing*, 19(4), 517–525. <https://doi.org/10.1007/s10339-018-0872-7>

**02/10/23**

### **Music and infancy**

Partanen, E., Kujala, T., Tervaniemi, M., & Huotilainen, M. (2013). Prenatal music exposure induces long-term neural effects. *PloS One*, 8(10), e78946. <https://doi.org/10.1371/journal.pone.0078946>

Trehub, S. E. (2001). Musical predispositions in infancy. *Annals of the New York Academy of Sciences*, 930(1), 1-16. <https://doi.org/10.1111/j.1749-6632.2001.tb05721.x>

Bainbridge, C. M., Bertolo, M., Youngers, J., Atwood, S., Yurdum, L., Simson, J., Lopez, K., Xing, F., Martin, A., & Mehr, S. A. (2021). Infants relax in response to unfamiliar foreign lullabies. *Nature Human Behaviour*, 5(2), 256–264. <https://doi.org/10.1038/s41562-020-00963-z>

**02/17/23**

### **Music and aging**

Fischer, C. E., Churchill, N., Leggieri, M., Vuong, V., Tau, M., Fornazzari, L. R., Thaut, M. H., & Schweizer, T. A. (2021). Long-known music exposure effects on brain imaging and cognition in early-stage cognitive decline: a pilot study. *Journal of Alzheimer's Disease*, 10.3233/JAD-210610. Advance online publication. <https://doi.org/10.3233/JAD-210610>

Román-Caballero, R., Arnedo, M., Triviño, M., & Lupiáñez, J. (2018). Musical practice as an enhancer of cognitive function in healthy aging - A systematic review and meta-analysis. *PloS One*, 13(11), e0207957. <https://doi.org/10.1371/journal.pone.0207957>

Jünemann, K., Marie, D., Worschech, F., Scholz, D. S., Grouiller, F., Kliegel, M., Van De Ville, D., James, C. E., Krüger, T., Altenmüller, E., & Sinke, C. (2022). Six Months of Piano Training in Healthy Elderly Stabilizes White Matter Microstructure in the Fornix, Compared to an Active Control Group. *Frontiers in aging neuroscience*, 14, 817889. <https://doi.org/10.3389/fnagi.2022.817889>

**02/24/23**

### **Music and Cognition**

Anvari, S. H., Trainor, L. G., Woodside, J., & Levy, B. A. (2002). Relations among musical skills, phonological processing, and early reading ability in preschool children. *Journal of Experimental Child Psychology*, 83, 111-130. [https://doi.org/10.1016/S0022-0965\(02\)00124-8](https://doi.org/10.1016/S0022-0965(02)00124-8)

Sala, G., & Gobet, F. (2020). Cognitive and academic benefits of music training with children: A multilevel meta-analysis. *Memory & cognition*, 48(8), 1429–1441. <https://doi.org/10.3758/s13421-020-01060-2>

Román-Caballero, R., Vadillo, M. A., Trainor, L., & Lupiáñez, J. (2022). Please don't stop the music: A meta-analysis of the cognitive and academic benefits of instrumental musical training in childhood and adolescence. *Educational Research Review*, 35, 100436. <https://doi.org/10.1016/j.edurev.2022.100436>

**03/03/23**

### **Music and political matters**

Greitemeyer, T., Hollingdale, J., & Traut-Mattausch, E. (2015). Changing the track in music and misogyny: Listening to music with pro-equality lyrics improves attitudes and behavior toward women. *Psychology of Popular Media Culture*, 4(1), 56–67. <https://doi-org.ezp-prod1.hul.harvard.edu/10.1037/a0030689>

Rasmussen, E. E., & Densley, R. L. (2017). Girl in a country song: Gender roles and objectification of women in popular country music across 1990 to 2014. *Sex Roles: A Journal of Research*, 76(3–4), 188–201. <https://doi-org.ezp-prod1.hul.harvard.edu/10.1007/s11199-016-0670-6>

Reagon, B. J. (1976). In Our Hands: thoughts on black music. *Sing Out!* Retrieved from: <http://nationalhumanitiescenter.org/pds/maai3/protest/text3/inourhands.pdf>

Treece, D. H. (1997). Guns and Roses: Bossa Nova and Brazil's music of popular protest, 1958-68. *Popular Music*, 16(1), 1-29.

**03/10/23**

### **Mid-term quiz**

**03/17/23**

### **Spring Recess**

No readings, just rest!

**03/24/23**

### **Music & Creativity**

Bashwiler, D. M., Wertz, C. J., Flores, R. A., & Jung, R. E. (2016). Musical creativity "revealed" in brain structure: interplay between motor, default mode, and limbic networks. *Scientific Reports*, 6, 20482. <https://doi.org/10.1038/srep20482>

Lock, G. (2011). Musical creativity in the mirror of Glaveanu's five principles of cultural psychology. *Culture & Psychology*, 17(1), 121–136.  
<https://doi.org/10.1177/1354067X10388853>

Ritter, S. M., & Ferguson, S. (2017). Happy creativity: Listening to happy music facilitates divergent thinking. *PloS One*, 12(9), e0182210.  
<https://doi.org/10.1371/journal.pone.0182210>

**03/31/23**

**Peer Review Day**

Lucey, B. (2013, September 27). Peer review: how to get it right – 10 tips. *The Guardian*. Retrieved from <https://www.theguardian.com/higher-education-network/blog/2013/sep/27/peer-review-10-tips-research-paper>

DeMaria, A. N. (2003). What constitutes a great review? *Journal of the American College of Cardiology*, 42(7), 1314-1315. <https://doi.org/10.1016/j.jacc.2003.08.020>

Assigned peer paper and poster draft

**04/07/23**

**Live music**

Heide, F. J., Porter, N., & Saito, P. K. (2012). Do you hear the people sing? Musical theatre and attitude change. *Psychology of Aesthetics, Creativity, and the Arts*, 6(3), 224–230. <https://doi.org/10.1037/a0027574>

Bush, H. I., LaGasse, A. B., Collier, E. H., Gettis, M. A., & Walson, K. (2021). Effect of live versus recorded music on children receiving mechanical ventilation and sedation. *American Journal of Critical Care*, 30(5), 343–349. <https://doi.org/10.4037/ajcc2021646>

Swarbrick, D., Bosnyak, D., Livingstone, S. R., Bansal, J., Marsh-Rollo, S., Woolhouse, M. H., & Trainor, L. J. (2019). How live music moves us: head movement differences in audiences to live versus recorded music. *Frontiers in Psychology*, 9, 2682.  
<https://doi.org/10.3389/fpsyg.2018.02682>

**04/14/23**

**Music as prevention and treatment**

Loui, P. (2020). Neuroscientific insights for improved outcomes in music-based interventions. *Music & Science*, 3, 2059204320965065. <https://doi.org/10.1177/2059204320965065>

Gómez-Gallego, M., Gómez-Gallego, J. C., Gallego-Mellado, M., & García-García, J. (2021). Comparative efficacy of active group music intervention versus group music listening in Alzheimer's disease. *International Journal of Environmental Research and Public Health*, 18(15), 8067. <https://doi.org/10.3390/ijerph18158067>

Gold, C., Saarikallio, S., Crooke, A., & McFerran, K. S. (2017). Group music therapy as a preventive intervention for young people at risk: cluster-randomized trial. *Journal of Music Therapy*, 54(2), 133–160. <https://doi.org/10.1093/jmt/thx002>

04/21/23

## Music and depression

Aalbers, S., Fusar-Poli, L., Freeman, R. E., Spreen, M., Ket, J. C., Vink, A. C., Maratos, A., Crawford, M., Chen, X. J., & Gold, C. (2017). Music therapy for depression. *The Cochrane database of systematic reviews*, 11(11), CD004517.

<https://doi.org/10.1002/14651858.CD004517.pub3>

\*\* Use this as a reference to assess the quality of the study you will focus on.

You will be assigned one of the studies below in the beginning of the semester.

Albornoz, Y. (2011) The effects of group improvisational music therapy on depression in adolescents and adults with substance abuse: a randomized controlled trial, *Nordic Journal of Music Therapy*, 20:3, 208-224, DOI: [10.1080/08098131.2010.522717](https://doi.org/10.1080/08098131.2010.522717)

Atiwannapat, P., Thaipisuttikul, P., Poopityastaporn, P., & Katekaw, W. (2016). Active versus receptive group music therapy for major depressive disorder-A pilot study. *Complementary therapies in medicine*, 26, 141–145.

<https://doi.org/10.1016/j.ctim.2016.03.015>

Erkkilä, J., Punkanen, M., Fachner, J., Ala-Ruona, E., Pöntiö, I., Tervaniemi, M., Vanhala, M., & Gold, C. (2011). Individual music therapy for depression: randomised controlled trial. *The British journal of psychiatry: the journal of mental science*, 199(2), 132–139.

<https://doi.org/10.1192/bjp.bp.110.085431>

Hanser, S. B., & Thompson, L. W. (1994). Effects of a music therapy strategy on depressed older adults. *Journal of Gerontology*, 49(6), P265–

P269. <https://doi.org/10.1093/geronj/49.6.P265>

Hendricks, C.B., Robinson, B., Bradley, L.J. and Davis, K. (1999), Using Music Techniques to Treat Adolescent Depression. *The Journal of Humanistic Counseling, Education and Development*, 38: 39-46. <https://doi.org/10.1002/j.2164-490X.1999.tb00160.x>

Zerhusen, J. D., Boyle, K., & Wilson, W. (1991). Out of the darkness: group cognitive therapy for depressed elderly. *Journal of psychosocial nursing and mental health services*, 29(9), 16–21. <https://doi.org/10.3928/0279-3695-19910901-06>

04/28/23

## Poster presentations

### COURSE ASSIGNMENTS

In-class participation (15%): I am sure you can contribute a lot to our classes, and I am counting on that! For that reason, I would love you to feel safe to **share your thoughts and critiques, ask your questions, as well as listen attentively to your peers as they voice their questions and comments**, and this is the goal of this activity. I will work to create this safe and welcoming

environment so that you feel comfortable enough to do so. My expectation will be that you also **contribute to this safe environment, engaging with your peers, respecting different points of view, and using science to support your views.** All with cordiality and respect. I am happy to give you constant feedback on your participation throughout the semester, but I will plan for one informal written feedback midway through the course to give you a sense of how your participation can improve. This will be graded on a 1-10 scale and will come with specific recommendations on how to improve your *in-class participation*. Please feel free to contact me if you want to discuss how you can improve your participation at any time.

*Class-discussion leading (20%)*. The goal of this assignment is to develop your communication and discussion-leading skills. This assignment will also give you the opportunity to connect with the course readings in a deeper level. You will lead the class in a discussion based on the readings for the week (Depending on enrolling, this may be one article part of the class instead). The components of this assignment should include:

- **Discussion plan (1/3 of the assignment grade)** — The week before leading the discussion, you will submit a discussion plan. This plan must include 1) your goals for the discussion, including teaching & learning objectives, and how you plan to motivate your peers to engage in the discussion; 2) discussion questions based on the material (your own questions while reading the material would be a great place to start for this piece); and 3) points of connections across readings, topics from previous weeks, and/or other courses;. and 4) how you plan to address the extra paper which you have selected for the discussion.
- **Leading the discussion (1/3 of the assignment grade)** — This is the moment when you will implement your discussion plan, encouraging conversations, asking questions, while also participating actively during our class – leading is not different that participating in the discussion, it actually means you will have a more active role throughout the class.
- **Discussion reflection (1/3 of the assignment grade)** — Following your discussion, you will submit a reflection on the experience and the work you did (1-2 pages double-spaced). You can write about things that went well and things that did not work out as expected. Be critical of your work and reflect whether the goals were achieved and what supported/hindered that. Within your reflection, note whether there is anything you might have done differently, and why.

I understand this activity can be stressful in several ways, so preparation is key to help deal with anxiety. And, although preparation can help, things in a classroom may not always go as we plan, so be kind to yourself. You will be graded on how prepared you were (discussion plan), on how you led the discussion (preparation, knowledge of the material, insightful questions), and on your reflection of it (discussion reflection). We can plan to meet if you have any questions or want to chat prior to you leading the discussion.

Mid-term quiz (15%): The mid-term quiz will consist of 25 questions (multiple choice questions, true or false) regarding the readings and topics discussed in class throughout the first half of the semester to be done in class. You may use your notes and materials while answering the quiz. Grading will be done according to the percentage of correct responses.

Final paper + poster presentation (35%): The final part of your grade will consist of a research paper combined with the presentation of your findings in a poster session.

- **Peer review (5%)** – You will serve as a reviewer to your peers' work during one of our classes. Every student will submit a first draft of their final paper to be reviewed by another student in class. This draft must be close to the final version. You will be expected to read your peer's paper prior to the class, discuss it with them, engage with their written material, and provide helpful written feedback to be incorporated in their work during our class. I will randomly assign one paper for each student in a way that each student will have at least one review. I expect you to engage with your peer's ideas (instead of grammar/writing style) and think of questions that other readers would have when reading their work, helping them identify blind spots in their work. These will also be submitted to me at the end of the class. One more time, be kind, respectful, and sensitive when offering feedback.
- **Final paper (25%)** – You will write an 8-10 page double-spaced research paper on a topic of your interest in the psychology of music. This is a paper that will address your research question of interest and should be supported by empirical evidence (using APA style) and written as a scientific paper. **The first draft of your paper is due on 03/29, by 11:59pm. The final version of your paper is due on 04/28, by the class meeting time.**
- **Poster presentation (20%)** – This assignment will simulate what people involved in scientific research do to communicate science: create and present a poster. This poster



will summarize your findings from the paper (the scientific content is the same) but organized in a way to be shared with other people visually. Although you should be ready to answer questions related to your research question, the poster should contain enough information to inform the reader. It must also have something pointing to the full text (such as a QR code) in case the reader wants to have access to the full paper.

## Course breakdown

<u>In-class participation</u>	15%
<u>Class-discussion leading</u>	20%
<u>Mid-term quiz</u>	15%
<u>Final project</u>	50%
<u>Peer review</u>	05%
<u>Final paper</u>	25%
<u>Poster presentation</u>	20%

## COURSE POLICIES

### COVID-19-related policies

We will strictly follow all COVID-related university mandates.

### Technology use in class

You will be allowed to use your favorite type of technology (e.g., laptop, iPad) in class if you choose to do so, since some people prefer taking notes that way. If you decide to use it, please avoid distractions, like e-mail checking or accessing social media during class.

### Academic integrity

You will be expected to be the author of the assignments you turn in for this course. I expect it to be your own, original work, and that you will be honest with me in matters concerning attendance and late assignments. Your papers will require you to draw upon existing research to inform and lend credibility to your arguments. To credit the ideas of others properly, you must follow two main rules:

- Always cite the source of a finding, idea, or argument that is not your own, no matter how much rewording you have done.
- Always put the findings, ideas, and arguments you cite into your own words. If a direct quote is absolutely necessary, put the text in quotation marks and include a page number in your citation.

It is important to remember that poor citation does not have to be intentional to be considered plagiarism. Plagiarized or improperly cited work will be referred to the office of Student Conduct and Community Standards for review and may result in severe penalties and disciplinary action. Please be very, very careful!

For more information on how to cite others' work, please consult the university guide to using sources: [https://guides.library.columbia.edu/columbia\\_university\\_buildings/citing\\_sources](https://guides.library.columbia.edu/columbia_university_buildings/citing_sources)

For more information on academic integrity, please consult the Columbia University Policies page: <https://bulletin.columbia.edu/columbia-college/university-policies/>

### Collaboration

This course will also include collaboration and exchange. During our classes, students are encouraged to actively discuss the course material and interact with one another. You may consult with your peers on the choice of papers and topics. However, be sure that every assignment reflects your own approach to the topic and is a result of your own research and writing, unless otherwise specified. Any type of help received with your writing (feedback on drafts, etc.) must be acknowledged on a separate page at the end of the assignment.

### Accommodations

If you request any consideration regarding a disability, please inform me and Office for Disability Services (ODS) at the beginning of the semester and we would be happy to accommodate all the necessary arrangements. You can find how to register with ODS from <https://health.columbia.edu/content/disability-services> or 212-854-2388.

### Absences and late assignments

You are expected to attend every class, since your participation in class will count towards your final grade. Students with excused absences (medical or family emergencies, illness, or other extenuating circumstances) will have a chance to complete missed class assignments (and participation) without penalties. Otherwise, class participation can only be completed during class. Please note that at least 75% attendance is expected to successfully complete this course (regardless of whether absences beyond that point are excused).

Assignments submitted after the deadline will be considered *late assignments*. Late assignments will be graded with ½ of the grade if submitted by no more than one week following the original

deadline. If not submitted within one week following the original deadline, late assignments will not be graded.