MUSIC MIND & BRAIN
Fall Quarter
2020-2021 ACADEMIC YEAR
SYLLABUS

Professor: Mark Tramo, MD PhD
Time: Thursdays 6:30 – 9:30 PM, Oct 1 – Dec 6, 2020
Location: UCLA Zoom

UPPER DIVISION COURSES
M103/M170. Music Mind & Brain (4)
Seminar = 3 hours/wk; outside study = 9 hours/wk.
This seminar course takes an interdisciplinary approach to understanding brain mechanisms mediating music perception, performance, and cognition. Students' natural interest in music serves as a springboard for learning music theory and basic concepts about how the brain works. Seminars focus on specific themes such as harmony perception, rhythm perception and production, emotion and meaning, and creativity. Fundamental principles in acoustics, psychophysics, cognitive psychology, neuroanatomy, and neurophysiology are emphasized. The course is designed to help students understand methodologies currently used to investigate mind-brain correlates in cognitive neuroscience research. After three introductory lectures, seminar study groups present key papers from professional neuroscience, music, psychology, and medical journals. Requirements include: 1) one oral slide presentation of a professional journal article as a member of a seminar study-group; 2) one transcript of a lecture or seminar as a member of a scribe study-group; and 3) a take-home final examination.

Note:
• Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in person at Murphy Hall A255. In order to ensure accommodations, students need to contact the CAE within the first two weeks of the term. Students who would like to help with a classmate’s accommodations, please call CAE at (310) 825-1501 or visit CEA in person at Murphy Hall A255.
• Please read the Student Code of Conduct (https://www.deanofstudents.ucla.edu/studentconductcode). According to Senate Regulation A-306 (https://senate.ucla.edu/regulations/chapter1#bootstrap-fieldgroup-accordion-item--section-4-grades-3), faculty and TAs are required to report suspected acts of academic dishonesty to the Office of Student Conduct (https://www.deanofstudents.ucla.edu/Contact-Us).
• Faculty and TAs are required under the UC Policy on Sexual Violence and Sexual Harassment to inform the Title IX
Faculty

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Music Industry Program, Dept of Musicology, UCLA Herb Alpert School of Music
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Guest Faculty

John Iversen, PhD
Research Scientist, Swartz Center for Computational Neuroscience, UCSD
Co-Director, University of California Multi-Campus Music Experience Research Initiative (UC MERCI)
Advisory Board, The Institute for Music & Brain Science
https://profiles.ucsd.edu/john.iversen
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Tom Sturges
Whiloc Head of Creative, Universal Music Publishing
Executive Board, The Institute for Music & Brain Science
https://www.songwriteruniverse.com/tom-sturges-123.htm

Prerequisites
• None

Enrollment
• Open to all UCLA undergraduates. Priority is given to students presently enrolled in the
Music Industry & Technology Program Major/Minor and Neuroscience Program Major/Minor
• PTEs – to be discussed during first seminar

Learning Outcomes
By the end of this course, students will have learned:
• Brain anatomy
• Music theory
• Musical acoustics
• Experimental psychology methods
• Brain imaging methods
• How to perform literature searches of professional, peer-reviewed journals
• How to understand the organization and content of professional journal articles
• How to do oral slide presentations of professional journal articles
• Detailed information about music perception, performance, and cognition

How your learning will be assessed
• Letter grading is based on attendance/participation (30%), one oral slide presentation as a member of a Seminar Study Group (20%), one transcript as a member of a Scribe Study Group (20%), and a comprehensive take-home final exam (30%).

Requirements
• ATTENDANCE/PARTICIPATION
- eye contact, ask/answer questions
- Zoom cameras on
- Zoom etiquette
- Each class is broken up into 3 blocks (50 mins each) separated by 2 breaks (10 mins each)
- Attendance Score = 10 classes/quarter x 3 blocks/class = 30 blocks/quarter
  1 point/block x 30 blocks/quarter = 30 points/quarter
- Attendance is taken for each of the three blocks every Thursday
- Electronic devices are prohibited from the classroom and must be turned off and stowed out of sight in order to receive 1 point per block
- Absences = zero points per missed block - unless the professor receives an email from a health professional, dean, faculty member, conductor, or coach no later than 1 week after the date of the absence (preferably before the date of the absence, if possible)

• PRESENTATION
- join a Seminar Study Group and give an oral slide presentation of a research paper from a professional journal on one of the seminar topics you’re most interested in. Two weeks before the presentation, each Seminar Study Group will meet after class with the professor and TA to go over the organization and contents of their talks. PDFs of the slides will be posted before class by each Seminar Study Group in the Discussion Forum on CCLE.

- **Presentation Score** = each student in each Seminar Study Group is awarded 20 points for a satisfactory presentation.

- **WRITTEN TRANSCRIPTS & THEME “CHAPTERS”**

  - join a Scribe Study Group and: 1) transcribe an audio recording of one 50-55 minute block of class on one of the topics you’re most interested in; 2) integrate the transcript with figures, tables, and text shown during class; and 3) edit the prose and illustrations so that the transcript you publish on CCLE flows like a chapter in a textbook you read in one of your General Education, Life Sciences, or Social Sciences courses. As a template, use a textbook you found useful in one of your previous courses or, for example, look inside *The Mind’s Machine* textbook used in Freshman Cluster 73, Purves et al.’s *Neuroscience* textbook, or Gleitman et al.’s *Psychology* textbook. Slides to be included in the transcript will be given to the Scribe Study Groups by the Seminar Study Groups. (Slides for the Introductory Lectures will be provided by the professor.) Audio recordings will be provided by the professor and TA.

- **Writing Score** = all the students who belong to each Scribe Study Group receive the same score for the Theme Chapter published in the Discussion Forum. In other words, the collaborative performance of the Scribe Study Group as a whole is graded. Scores for the written chapter range from 10 points (satisfactory) to 20 points (outstanding).

- **READING**

  - PDFs uploaded onto CCLE by each Seminar Study Group, the professor, and the TA

  - **Recommended Books**

    - *The Unanswered Question*. Leonard Bernstein, 1976
    - *On the Sensations of Tone as a Physiological Basis for the Theory of Music, 2nd Edition*. Hermann Helmholtz, 1885
    - *Music as Biology*. Dale Purves, 2017
    - *The Auditory Cortex*. Jeffrey Winer & Christopher Schreiner (Eds), 2011

  - Articles from professional neuroscience, psychology, music, and medical journals:
    - go to The Institute for Music & Brain Science website, [http://www.brainmusic.org/](http://www.brainmusic.org/)
    - on the Home Page, click on “Education”; there, click on “Institute’s eLibrary”
- find the PDF using the author’s name(s) or title of the paper
- download/read the PDF of the paper
OR
- go to the UCLA electronic library, search e-journals using the name of the journal the paper was published in
- find the year, volume, and page number of the paper
- download/read the PDF of the paper

• FINAL EXAMINATION
A 3-hour take-home final examination will be administered via CCLE on Thursday December 17th 6:30 PM. *The exam must be completed independently by each student.* Your completed exam is due in the professor’s and teaching assistant’s mailboxes no later than 11:59 PM on Thursday December 17th.

**LECTURE & SEMINAR SCHEDULE**

*Monday Sept 28 = Fall Quarter begins*

*Thursday Oct 1 = Instruction begins*

**Thurs Oct 1**
Lecture 1
*Introduction to Music, Mind, & Brain*
• Course Overview & Syllabus
• Seminar Themes & Study-Groups
• Practicum: How to Find Peer-Reviewed Professional Journal Articles
  • How the Brain Works

**Thurs Oct 8**
Lecture 2
*Mind-Brain Correlates*
• Functional Organization of the Human Brain
• Functional Brain Organization & Music Cognition
  *The Sound of Music*
  • Pictures of Sound
  • Musical Acoustics
• Theory of Harmony in Western Tonal Music: Mathematical Descriptions & Cognitive-Perceptual Schemata
Thurs Oct 15
Lecture 3

*The Sound of Music (continued)*

- *Diabolus in Musica*: The Devil’s Tone in Rock Music
- The Harmonic Series & Major Triads:
  - Mozart, The Star-Spangled Banner, Leonard Bernstein, & The Beatles’ Royal Command Performance
- Rameau’s *Basse Fondamentale* & the Case of the “Missing” Fundamental

*Philosophy of Science*

- Logical Atomism, Testable Hypotheses, & Falsificationism

*Cognitive Neuroscience*

- Conceptual Approaches to Mind-Brain Correlates
- Experimental Approaches to Mind-Brain Correlates

Fri OCT 16 - Study List deadline (becomes official)

Thurs Oct 22

*Seminar 1: Pitch Perception*

- Neural Representations of Tone Frequency in the Cerebral Hemispheres:
  - Microanatomy, Neurochemistry, & Neurophysiology
  - Functional Neuroanatomy of Pitch Perception:
    - Lesion Effects in Stroke & Epilepsy Patients
- Parallel Discoveries in the Laboratory & Recording Studio:
  - JNDs, Auditory Illusions, & The Beatles

Thurs Oct 29

*Seminar 2: Harmony Perception*

- Psychoacoustics of Tonal Harmony: Consonance & Dissonance
- Cerebral Lateralization & Harmony Perception: Split-Brain Experiments
  - Neuropohysiology of Harmony Perception:
    - Cortical Event-Related Potentials

Thurs Nov 5

*Seminar 3: Melody Perception*

- Limits on Humans’ Tonal Information Processing Capacity:
  - Miller’s Magical Number 7, Plus or Minus 2
- Experimental Psychology of Melody Perception
- Functional Neuroanatomy of Melody Perception:
  - Cortical Lesion Effects in Stroke & Epilepsy Patients
Thurs Nov 12
Seminar 4: Rhythm Perception & Production
Guest Professor: Dr. John Iversen, UCSD
• Introduction
• Rhythm, Dance, & Sensorimotor Integration
  • Rhythm Perception in Infants
• Neurophysiological Correlates of Rhythm Perception:
  Magnetoencephalography (MEG)
• Functional Neuroanatomy of Rhythm Perception: fMRI &
  Cortical Lesion Effects in Stroke & Epilepsy Patients

Wed Nov 11 – Veterans Day Holiday

Thurs Nov 19
Seminar 5: Emotion & Meaning in Music
• Emoji’s vs. Words: Semiotics in Music, Language, & American Culture
  • Psychophysiology & the Autonomic Nervous System:
    Chills, Thrills, & Subconscious Processing
• Neurochemical and Neuroanatomical Correlates of
  Emotional & Autonomic Responses to Music: fMRI, PET, & Lesion Effects

Thurs-Fri Nov 26-27 – Thanksgiving holiday

Thurs Dec 3
Seminar 6: Intelligence, Talent, & Creativity
Guest Professor: Tom Sturges
• Howard Gardner’s Theory of Multiple Intelligences
• Music Training, Development, & Neural Plasticity
• “Perfect” Pitch Perception & Auditory Cortex Morphometry
• Functional Neuroanatomy of Jazz & Rap Improvisation
  • Creativity & Music in Everyday Life

Thurs Dec 10
Seminar 7: Music, Health, & Medicine
• Effects of Music on Autonomic Indices of
  Pain & Stress in Hospitalized Infants
• Effects of Music in Post-Surgical ICU Patients
• Melodic Intonation Therapy for Speech Disorders in Stroke Patients
• Music & Movement in Parkinson Disease & Stroke Patients

Fri Dec 11 – Instruction ends
Sat Dec 12 - Fri Dec 18 – Final Examinations

Thurs Dec 17
Final Examination

Fri Dec 18 – Quarter ends