

**MUSC 5211 Special Topic III in “Music, Industry, and Creativity”
Music Performance and Artificial Intelligent
Summer 2025**

Mondays and Thursdays, 6:30-9:00pm
HYS LG04

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Office Hours: By appointment

Course description

What makes a musical performance expressive? What distinguish a computer-generated performance from a human performance? Can AI play expressively like a human? This course begins with an inquiry of musical expression and interpretation as a form of human communication, then attempts to model musical performance in a quantitative way for computational modeling. It includes systematic studies of interpretive parameters (voicing, phrasing, dynamics, timing, etc.), interaction in collaborative performance, performance data acquisition through an augmented instrument (i.e. Disklavier piano), computer analysis of music performance using Python, and an introduction to artificial intelligence for performance synthesis. Along with lectures and hands-on activities, students will engage in a project that to experience how to apply AI in music research.

Course components

Components of the course include lectures, discussion and in-class active learning activities.

Blackboard at CUHK

<https://blackboard.cuhk.edu.hk/>

This course will require you to log on to Blackboard regularly. Important announcements and course information such as syllabus, class powerpoints, readings etc. will be posted on Blackboard. If you have missed a class, please check Blackboard to make sure that you have all the necessary materials in your possession.

Evaluation

Assessment type	Percentage
Attendance and participation in class discussion	

Assignments	
Presentation and project submission	
TOTAL	100%

Assessment Criteria

Class session participation:

- Quality and preparedness of the discussion
- Critical reflection on the class materials
- Analytical engagement with the work

Assignments and project:

- Stylistic knowledge and analytical understanding
- Critical judgement
- Argument and organization
- Coherence and perceptiveness in treatment of subject
- Quality of analytical application and discernment in evaluation
- Critical acumen and originality
- Effectiveness of communication

Project

Students will use the Disklavier piano to capture digital signals generated from real performances. They will then apply the theory and computing skills learned in the lectures to analyze these performances. Students may also attempt using AI to re-create piano performance and play the results with the Disklavier piano for evaluation.

Attendance and participation

Class attendance and participation are required. Please notify me in advance if you know you will need to miss class. Each **unexcused absence** beyond the second will result in a **2%** deduction from the final grade. Arriving **late** more than twice will lower your final grade **1%** each time. *Missing six or more classes for any reason is grounds for failing the course.*

Class/ week	Date	Topic
Week 1	May 12	Course Introduction Introduction to expressivity and interpretation in music performance
Week 1	May 15	Musical Expression <ul style="list-style-type: none"> • Stability and random variation • Rule-based variation • Idiosyncratic variation
Week 2	May 19	Musical Interpretation Practical application of generative rules <ul style="list-style-type: none"> • Voicing • Deconstructing phrasing

Week 2	May 22	Practical application of generative rules <ul style="list-style-type: none"> • Dynamic and micro-dynamic • Timing
Week 3	May 26	Communication and interaction in ensemble performance
Week 3	May 29	Technology related to performance interaction
Week 4	Jun 2	Computational Modeling and Data Analysis <ul style="list-style-type: none"> • Computational modeling of performance
Week 4	Jun 5	Computational Modeling and Data Analysis <ul style="list-style-type: none"> • Statistical tools for performance analysis
Week 5	Jun 9	Introduction to Python programming <ul style="list-style-type: none"> • Data manipulation, functions, control flows • Basic programming techniques
Week 5	Jun 12	Introduction to Python programming <ul style="list-style-type: none"> • Use of Python libraries
Week 6	Jun 16	Introduction to Artificial Intelligence <ul style="list-style-type: none"> • Principle of machine learning • Artificial neural networks
Week 6	Jun 19	Introduction to Artificial Intelligence <ul style="list-style-type: none"> • Re-creation with AI
Week 7	Jun 23	Presentations
Week 7	Jun 26	Presentations

Submission Due:

No make-ups will be given for final presentation.

References

Ceder Naomi. *The Quick Python Book, 3rd edition*. Manning Publications, 2018.

Efron, Bradley and Trevor Hastie. *Computer Age Statistical Inference*. Cambridge University Press, 2021.

Juslin, Patrik N., Anders Friberg, and Roberto Bresin. "Toward a Computational Model of Expression in Music Performance: The GERM Model." *Musicae Scientiae*, Special Issue 2001-2002, 63-122, September 2002.

King, Elaine and Anthony Gritten. "Dialogue and Beyond: Communication and Interaction in Ensemble Performance." In *Musicians in the Making: Pathways to Creative Performance*, ed. John Rink, Helena Gaunt and Aaron Williamon. Oxford University Press, 2017.

Lehmann, Andreas C., John A. Sloboda, and Robert H. Woody. "Expression and Interpretation." In *Psychology for Musicians: Understanding and Acquiring the Skills*. New York: Oxford University Press, 2007. Oxford Scholarship Online, 2011. doi: 10.1093/acprof:oso/9780195146103.003.0005.

Repp, Bruno H. "Patterns of Expressive Timing in Performances of a Beethoven Minuet by Nineteen Famous Pianists." *Journal of the Acoustical Society of America*, vol.88, no.2, 622-641, 1990.

Sinn, Deborah Rambo. *Playing Beyond the Notes: A Pianist's Guide to Musical Interpretation*. Oxford University Press, 2013.

Windsor, Luke. "Measurement and Models of Performance." In *Oxford Handbook of Music Psychology*, ed. Susan Hallam, Ian Cross, and Michael Thaut. Oxford University Press, 2008. Oxford Scholarship Online, 2012. Doi: 10.1093/oxfordhb/9780199298457.013.0030.