MUCP 4690/5690 - Coding Music: Computational Approaches to Music Creation

Instructor and office hours

Marco Buongiorno Nardelli
Department of Physics and Division of Composition Studies
Office: Physics 315 - tel. (940) 3698596 - e-mail: mbn@unt.edu - URL: http://materialssoundmusic.com
Office hours by appointment.

Schedule

This course takes place in person in the CEMI Studio 2009, We 3-5:40 PM. Course material and assignment submission will be in Canvas.

Textbooks

1. Pedro Kroger, Music for Geeks and Nerds, https://pedrokroger.net/mfgan free download of books and data: https://github.com/kroger/books/blob/master/README.md
2. Other text will be suggested during the course as optional reading material.

Online resources

https://www.complexityexplorer.org/courses/201-music-computation-and-complexity

Outline

This is an immersive, project-based course designed to cultivate a computational mindset for creative musical expression. Spanning the spectrum from symbolic music systems to audio generation and live coding environments, the course emphasizes both conceptual understanding and hands-on applications.

Students will explore the design and implementation of algorithmic and generative compositional models using Python, supported by a rich ecosystem of open-source libraries. No prior experience with programming is required; the course integrates foundational coding instruction with critical analysis of musical "scores"—understood both as traditional notation and as executable code. Through creative coding exercises, students will engage deeply with the compositional process, developing tools and systems that enable new forms of musical thinking and practice.

This course is not just about learning how to write music with code; it's about rethinking how we conceptualize, structure, and interact with sound through computational systems and gaining a broadened perspective on how computation can inform and expand the boundaries of music creation.

Course Objectives

Upon successful completion of this course, you will be able to:

1. learn advanced python programming structures and fundamentals of modular programing applied to music composition and analysis

2. given a compositional problem, design the algorithm that will allow you to solve it effectively - develop your *computational musical thinking*
3. learn how to use computation as a meaningful interpretation of musical data structures.
4. learn the most efficient visualization techniques for the problem at hand.
5. Apply music coding to audio and sound design in fixed or live performances=

Prerequisites

There are no required prerequisites for this course. However, in order to be successful in this course you will need to:

- have a basic computer literacy, including understanding of editors, shells, and installation of computing environments (installation of anaconda python is required)
- understand the basic logic of python programming structures, such as variables, iterators, logic statements etc.
- have the ability of designing algorithms for representative musical problems

Syllabus

Module 1. Review of python programming
Module 2. Introduction to algorithmic composition
Module 3. The primitives of Music
Module 4. Working with randomness
Module 5. Music from Math and Data
Module 6. Music from process
Module 7. Computational models in music theory
Module 8. Music and complexity
Module 9. Individual instruction/composition
Module 10. Individual instruction/composition
Module 11. Tools for audio and sound data.
Module 12. Python scores in live performance.
Other subjects can be discussed upon completion of the required modules.

Grading

Grading will be based on the successful completion of the modules in the allotted time. Students will return their assignments as jupyter notebooks through Canvas.

Course Technology & Skills

Minimum Technology Requirements

- Computer

Computer Skills & Digital Literacy

- Using Canvas
- Downloading and installing software

Course Policies

Attendance

Students are expected to attend class meetings regularly and to abide by the attendance policy

established for the course. It is important that you communicate with the professor and the instructional team prior to being absent, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings because you are ill, in mindfulness of the health and safety of everyone in our community.

UNT POLICIES

Academic Integrity Policy

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. [Insert specific sanction or academic penalty for specific academic integrity violation.

ADA Policy

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website at disability.unt.edu.

Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Blackboard for contingency plans for covering course materials.

Retention of Student Records

Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Blackboard online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

Acceptable Student Behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. The Code of Student Conduct can be found at deanofstudents.unt.edu/conduct.

Access to Information - Eagle Connect

Students' access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail: eagleconnect.unt.edu/

Student Evaluation Administration Dates

Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website at http://spot.unt.edu/ or email spot@unt.edu.

Sexual Assault Prevention

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.