Music Technology (MUST)

Courses

MUST 1220. Introduction to Music Technology. (4 Hours)
Provides students with instruction in the use of a computer for composing original music. Topics include MIDI sequencing, digital audio processing, and sound synthesis. Students use music hardware and software to complete a variety of projects.

Attribute(s): NUpath Analyzing/Using Data

MUST 1990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions. May be repeated without limit.

MUST 2102. Composing with Digital Technologies. (4 Hours)
Offers students an opportunity to create compositions using a digital audio workstation (DAW) as the principal tool. Standard Western music notation may be used in examples of certain techniques but will not be necessary for the creation of work in the course. Explores various composition topics such as periodicity, form, texture, timbre, and contour in the digital domain. Consists of a number of short composition and listening assignments culminating in the creation of compositions of moderate duration.

Prerequisite(s): MUST 1220 with a minimum grade of D-
Attribute(s): NUpath Creative Express/Innov

MUST 2320. Sound Design. (4 Hours)
Instructs students in the art of producing and designing musical accompaniments for a variety of media including film, TV commercials, industrial video, animation, games, theatre, and radio drama. Focuses on abstract thinking regarding sound theory and practice and includes hands-on skills. Restricted to music majors and combined majors; all other students require permission of instructor.

Attribute(s): NUpath Creative Express/Innov

MUST 2431. Computer Music Fundamentals. (4 Hours)
Focuses on the creation and implementation of standard time-domain audio synthesis routines and effects, as well as standard frequency-domain processing routines. MaxMSP is the principal programming environment used in the course. Begins with programming protocols, as well as data structures and storage, and list processing in the MaxMSP environment before moving on to standard synthesis and audio processing routines. Examines how the techniques learned in the course can be applied using a variety of synthesis and spectral processing software applications that are standard in the field.

Prerequisite(s): MUST 1220 with a minimum grade of D-
Attribute(s): NUpath Analyzing/Using Data, NUpath Formal/Quant Reasoning

MUST 2990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions. May be repeated without limit.

MUST 3300. Musical Interactions in Extended Reality. (4 Hours)
Explores the immersive world of extended reality—a general term that includes augmented reality, virtual reality, and mixed reality—with a specialized focus on musical interactions. Offers students an opportunity to gain the skills and knowledge to leverage XR software and hardware for the design of interactive musical applications. Introduces scripting, sensing, and interaction paradigms tailored for XR, with a unique lens on the integration of musical elements including sampling, real-time synthesis and processing, 3D/spatialized audio, as well as musical performance.

Prerequisite(s): MUST 2431 with a minimum grade of D-
Attribute(s): NUpath Formal/Quant Reasoning, NUpath Natural/Designed World

MUST 3601. Digital Audio Signal Processing. (4 Hours)
Introduces students to digital signal processing as it relates to offline or non-real-time audio processing. Covers fundamental engineering concepts and mathematics. Examines implementation details of common digital audio processing routines using the C programming language, the industry standard for audio software engineering.

Prerequisite(s): MUST 2431 with a minimum grade of C
Attribute(s): NUpath Analyzing/Using Data, NUpath Formal/Quant Reasoning

MUST 3602. Electronics for Music. (4 Hours)
Introduces analog electronics in the context of audio synthesis and control. Topics include the basics of electronics and analog audio signals; passive components, transistors, operational amplifiers, and sensors; analog audio synthesis, filters, amplification, and modulation; and the basics of hacking and circuit bending. In-class activities center on designing, building, analyzing, and testing sound-emitting circuits.

Prerequisite(s): MUST 2431 with a minimum grade of C
Attribute(s): NUpath Creative Express/Innov, NUpath Natural/Designed World

MUST 3603. Embedded Audio Programming. (4 Hours)
Explores embedded computers and their employment for the design of interactive audio applications. Studies how to program audio applications that take advantage of the unique features of these systems, which is accomplished by transferring the coding skills acquired on general-purpose computers to the languages and the programming rationales of embedded hardware. Primarily covers low-latency, real-time audio synthesis/processing, but also offers an in-depth introduction to physical computing, sensors, and simple electronics. Offers students an opportunity to gain experience with the full design-development-test cycle of software and hardware interactive audio technologies through a final project.

Prerequisite(s): MUST 2431 with a minimum grade of C
Attribute(s): NUpath Creative Express/Innov, NUpath Natural/Designed World

MUST 3973. Special Topics in Music Technology. (1-4 Hours)
Focuses on topics related to current trends in the area of music technology. Topics vary with each offering. May be repeated up to two times for up to 12 total credits.

Prerequisite(s): MUST 1220 with a minimum grade of C

MUST 3990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions. May be repeated without limit.

MUST 4610. Composition for Electronic Instruments. (4 Hours)
Instructs students in the composition of original music for electronic and computer-based instrumentation. Students create music to accompany video, animation, and film, and study suitable methods for creating original music for the Internet. Also surveys examples of music written for similar contexts.

Prerequisite(s): MUST 2431 with a minimum grade of D-
Attribute(s): NUpath Creative Express/Innov, NUpath Interpreting Culture

MUST 4611. Music Technology Capstone. (4 Hours)
Guides students in the research, preparation, and presentation of their own work in music technology. Projects may include music compositions, multimedia pieces, novel software or hardware tools for composition/performance, interactive sound installations, or other projects that bridge students' cumulative educational careers with future professional pathways. Offers students an opportunity to present their work to a public audience in an on-campus interdisciplinary event at the end of the semester.

Prerequisite(s): MUSC 4510 with a minimum grade of C or MUST 3300 with a minimum grade of C or MUST 3601 with a minimum grade of C or MUST 3602 with a minimum grade of C or MUST 3603 with a minimum grade of C or MUST 3973 with a minimum grade of C or MUST 4610 with a minimum grade of C or MUST 5973 with a minimum grade of C
Attribute(s): NUpath Capstone Experience, NUpath Writing Intensive

MUST 4990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions. May be repeated without limit.

MUST 4994. Internship. (4 Hours)
Offers students an opportunity for internship work. May be repeated twice.

Attribute(s): NUpath Integration Experience

MUST 5973. Special Topics in Music Technology. (3,4 Hours)
Focuses on various topics related to music technology. May be repeated up to two times for up to 12 total credits.

MUST 6603. Embedded Programming for Digital Musical Instruments. (4 Hours)
Explores embedded computers and their employment for the design of digital musical instruments. Studies how to program low-level audio applications that take advantage of the responsiveness and the interactive features of embedded systems. Starts with an overview of high-level embedded audio programming; then transitions into a deep exploration of low-level C++ programming techniques, specific for the design of digital musical instruments. Primarily covers low-latency real-time audio synthesis/processing, yet includes an in-depth introduction to physical computing, sensors, and simple electronics. Offers students an opportunity to gain experience with the full design-development-test cycle of software and hardware components of digital musical instruments within the confines of a final project. Requires knowledge of audio and programming.