Introduction to multitrack recording and production using AVID Pro Tools HD systems. Contemporary recording studio production techniques including microphone selection, placement, analog and digital signal paths, speaker monitors and studio acoustics. Techniques for recording drums, bass, piano, guitar, woodwinds, strings and vocals. Practical hands-on experience with professional recording artists and student collaborations.
1. set up a complex microphone array (24 tracks) for a band and record digital signals in a tracking session.
2. set up a digital and software mixer for tracking, recording, and monitoring to acquire sound at the correct recording levels.
3. use Advanced Digital Signal Processing to alter the recorded sound.
4. create a master recording to CD with proper mix levels.
5. create multiple audio delivery for CD, DVD, and internet in stereo and 5.1 surround.

COURSE OBJECTIVES:
1. Set up a complex microphone array (24 tracks) for a band and record digital signals in a tracking session.
2. Set up a digital and software mixer for tracking, recording, and monitoring to acquire sound at the correct recording levels.
3. Use Advanced Digital Signal Processing to alter the recorded sound.
4. Create a master recording to CD with proper mix levels.
5. Create multiple audio delivery for CD, DVD, and internet in stereo and 5.1 surround.

COURSE CONTENT:

LECTURE CONTENT:

A. Digital audio workstations: equipment
   1. Computer requirements
   2. Electronic theory - connections and wiring
   3. Electronic theory - analog to digital convertors
   4. Signal flow - headphone routing

B. Advanced microphone theory
   1. Tube microphone design
   2. PZM microphone design
   3. Ribbon microphone design
   4. Stereo microphone placement and theory
   5. Decatree microphone placement and theory

C. Principles of digital effects and dynamic range processing
   1. Reverberation
   2. Equalization
   3. Dynamics and compression
   4. Delays
   5. Pitch correction
   6. Noise gate
   7. Flange
   8. Chorus

D. Digital audio workstations: ProTools and Logic
   1. Software interface
   2. Tracking interface
   3. Digital mixer interface
   4. MIDI Functions
   5. Software Instruments and Loops

E. History of digital audio transmission
   1. AES/EBU (Audio Engineering Society/European Broadcast Union)
   2. S/PDIF (Sony/Philips Digital Interface Format)
   3. ADAT Lightpipe (Alesis Digital Audio Tape)
   4. Workclock
   5. SMPTE timecode (Society of Motion Picture and Television Engineers)

F. Advanced mixing techniques
   1. Automation- for digital and software mixers
2. Mix Bus and Return
3. Side Chain
4. Complex digital signal processors
5. Surround sound mixing

G. Mastering
1. Bouncing
2. Normalizing
3. Mastering Digital Signal Processors
   a. Equalization
   b. Compression
   c. Limiter
   d. Volume - individual tracks vs. entire CD or DVD
   e. Mastering and CD burning software

H. Monitoring
1. Headphone
2. Stereo monitors
3. Surround sound monitors
4. Design and theory of powered vs. unpowered monitors
5. Monitor placement

I. Audio for digital media sources
1. CD and DVD
2. Internet audio
3. Audio for computer games

J. Audio streaming and the Internet
1. Bit rate for audio streaming
2. Codecs (mp3, AC3, DTS)
3. Compression schemes
4. MPEG encoding

LABORATORY CONTENT:

A. Lab Content:
1. Labs will consist of audio projects including recording and editing of assigned material. Students will use computer editing stations with audio, video and design software provided. Live music will be recorded using microphones and a digital recording console and recording software. Tracks will be mixed on individual workstations using Digital Signal Processing.

METHODS OF INSTRUCTION:

A. Lecture:
B. Lab:
C. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:

Reading Assignments

Text
Websites
Handouts

Out-of-class Assignments

Writing Assignments

The student will create a completed audio master using multi-layered audio, digital signal processing, and completed mix.
METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Essay Examinations
Objective Examinations
Report
Projects (ind/group)
Problem Solving Exercises
Oral Presentations
Skills Demonstration

Demonstration of Critical Thinking:
Students will set up a signal between a vocal track and a vocoder using advanced digital signal processing, and choose the correct parameters to record the new processed track and play back at the correct levels in a mix.

Required Writing, Problem Solving, Skills Demonstration:
The student will create a completed audio master using multi-layered audio, digital signal processing, and completed mix.

TEXTS, READINGS, AND RESOURCES:
TextBooks:

LIBRARY:
Adequate library resources include:

Comments:

Attachments:
Attached Files