College of San Mateo
Official Course Outline

1. **COURSE ID:** MUS. 222 **TITLE:** Live Sound and Streaming
   Units: 3.0 units **Hours/Semester:** 32.0-36.0 Lecture hours; 48.0-54.0 Lab hours; 64.0-72.0 Homework hours; 144.0-162.0 Total Student Learning hours
   Method of Grading: Grade Option (Letter Grade or Pass/No Pass)
   Prerequisite: MUS. 290, or DGME 118

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   This course provides hands-on experience in equipment setup and operation, troubleshooting, sound checking, and mixing sound for live music performances and streaming applications. Topics include sound system theory and applications and individual sound system component operation (microphones, mixers, effects, power amplifiers, and speaker systems).

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Set up, operate, and troubleshoot the components of a sound reinforcement system for mixing, monitoring, recording, and streaming a live music performance in a variety of genres.
   2. Demonstrate knowledge of room acoustics, audio principles, and instrument sound production by selecting and implementing microphones and direct boxes appropriate to live sound needs.
   3. Apply mixing techniques and signal processing in order to achieve desired creative and technical outcomes for a live event.
   4. Demonstrate professional communication and collaboration skills as a sound reinforcement team member supporting a live event.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Set up, operate, and troubleshoot the components of a sound reinforcement system for mixing, monitoring, recording, and streaming a live music performance in a variety of genres.
   2. Demonstrate knowledge of room acoustics, audio principles, and instrument sound production by selecting and implementing microphones and direct boxes appropriate to live sound needs.
   3. Apply mixing techniques and signal processing in order to achieve desired creative and technical outcomes for a live event.
   4. Demonstrate professional communication and collaboration skills as a sound reinforcement team member supporting a live event.

6. **COURSE CONTENT:**
   Lecture Content:
   1. Jobs and Roles in the Live Sound Industry
      A. Front of house (FOH) mix engineer
      B. Monitor mix engineer
      C. Wireless RF coordinator
      D. Lighting technician
      E. Technical director
      F. Stage manager
   2. Client Interaction and Event Preparation
      A. Client communication
      B. Technical riders
      C. Input lists
      D. Stage plots
      E. Backline
      F. Working as a sound reinforcement team member
   3. Acoustics, Psychoacoustics & Sound Principles

A. Sound wave propagation
B. Frequency
C. Amplitude
D. Phase and phase relationships
E. Harmonics and partials
F. Reverberation
G. Reflection and diffraction
H. Effect of weather, temperature, humidity and wind on sound
I. Inverse distance and inverse square laws

4. Human Hearing System
    A. Basic anatomy of the ear
    B. Equal loudness curves
    C. Localization
    D. Hearing protection
5. Measuring Sound
    A. Visual representations of sound
    B. Hertz
    C. Decibels
    D. SPL meters
    E. Meter types
6. Sound Reinforcement System Components
    A. Speakers and Amplifiers
        a. Portable speaker systems
        b. Small venue installations
        c. Large-scale venue installations
        d. Stage monitors and in-ear monitors
    B. Microphones
        a. Dynamic vs. condenser
        b. Phantom power
        c. Polar patterns
        d. Frequency response
        e. Windscreens and pop filters
    C. D.I. Boxes
    D. Snakes and stage boxes
    E. Cables and Connectors
        a. Balanced vs. unbalanced connections
        b. Analog vs. digital connections
        c. Signal levels
        d. Impedance
        e. Cable wrapping, storage, and management
    F. Mixing Consoles
        a. Analog vs. digital mixers
        b. Channel strip
        c. Input and output busses
        d. Auxiliary sends and returns
        e. Inserts
        f. EQ
        g. Onboard and outboard effects
        h. Gain staging
    G. Stands, Mounts and Racks
7. Signal Flow
8. Testing and Troubleshooting
    A. Identifying feedback, noise, and distortion
    B. Using sound system test equipment and calibration tools
    C. Troubleshooting sound reinforcement installations
9. Recording Options for Capturing a Live Performance
    A. Multi-track recording using a mixing console
    B. Digital audio workstations and sound editors
    C. Portable stereo and multi-track recorders
10. Live Streaming

A. Review of digital audio principles
B. Comparison of live streaming platforms and software
C. Internal audio routing solutions
D. Internet speed and bandwidth
E. Video encoders and switchers
F. Real-time music collaboration

11. Optional Related Topics
    A. Wireless audio systems
    B. Surround sound systems
    C. Lighting systems
    D. Video projection and playback systems
    E. History of live sound

Lab Content:

1. Test and compare the acoustic characteristics and behavior of sound in different rooms
2. Use a sound level meter to take dB SPL measurements
3. Set up and properly connect the components of a sound reinforcement system
4. Operate audio playback devices and software
5. Select microphones for a live sound application based on practical and stylistic considerations
6. Implement microphone placement techniques to optimize sound quality and musical expression
7. Set microphone levels using proper gain staging
8. Perform a sound check with a soloist, band, or other ensemble
9. Create a monitor or headphone mix using auxiliary sends
10. Apply panning and volume level adjustments using a mixing console
11. Apply EQ and other signal processing such as reverb and delay to live sound sources using onboard and outboard effects processors
12. Set up and operate RF wireless transmitters and receivers
13. Troubleshoot a live sound situation using a methodical process informed by knowledge of signal flow
14. Create special effects with lighting
15. Set up live-streaming of audio and video
16. Plan the live sound setup for a soloist, band, or ensemble by consulting a technical rider and stage plot
17. Demonstrate good customer service, including professional appearance, attitude and behavior expected in client environments

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Lab
C. Activity
D. Field Experience
E. Observation and Demonstration

8. **REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Short reports describing the strategies and techniques implemented in live sound reinforcement activities.
Annotated signal flow diagrams.

Reading Assignments:

Weekly readings from assigned texts including the textbook, equipment and software manuals, equipment and software reviews, and articles on audio engineering principles.

Other Outside Assignments:

Lab Assignments: Acoustic Measurements, Ear Training, Sound System Setup and Connections, Cable Wrapping and Management, Setting Microphone Levels, Microphone Techniques and Placement, Mixer Techniques, Recording, Signal Processing, RF Wireless Setup and Operation, Live Streaming.
Projects: Select and apply the proper sound system components and techniques for a performance by a soloist, band, or ensemble.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Class Participation
B. Class Work

C. Exams/Tests
D. Group Projects
E. Homework
F. Lab Activities
G. Projects
H. Quizzes

10. **REPRESENTATIVE TEXT(S):**
Possible textbooks include:
A. Gibson, B.. *The Ultimate Live Sound Operator's Handbook*, 3rd ed. Rowman & Littlefield Publishers, 2020

Origination Date: November 2021
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Effective Term: Fall 2022
Course Originator: Adria Otte