

**Course Syllabus**

**MUSC 1327**

**AUDIO ENGINEERING I**

**McLennan Community College**  
**Waco, TX**

Revised 07-08

# MUSC 1327 AUDIO ENGINEERING I

Instructor Brian Konzelman Office PAC 124 Phone 299-8231

## WHAT IS THIS COURSE?

AUDIO ENGINEERING I is the first semester Audio Technology course. This course consists of lecture sessions, followed by a laboratory in which students can work with the materials and equipment covered by the lecture.

The text book is MODERN RECORDING TECHNIQUES (third edition), by Huber-Runstein.

Periodical reading and reports will be from Studio Sound magazine, EQ magazine, Electronic Musician Magazine.

## Disabilities/ADA

In accordance with the requirements of the Americans with Disabilities Act (ADA) and the regulations published by the United States Department of Justice 28 C.F.R. 35.107(a), MCC's designated ADA co-coordinators, Dr. Johnette McKown, Executive Vice President and Dr. Lynn Abernathy, Vice President, Student Services shall be responsible for coordinating the College's efforts to comply with and carry out its responsibilities under ADA. Students with disabilities requiring physical, classroom, or testing accommodations should contact Marc Sweatt, Disability Specialist, at 299-8122 or [msweatt@mclennan.edu](mailto:msweatt@mclennan.edu).

## ATTENDANCE POLICY:

Because of the technical nature of this course, tardiness or missed classes will seriously jeopardize your chances of success. If you experience a true emergency and must miss a class, contact the fine arts office. Your attendance will affect your grade as follows:

3 tardy = 1 absence

Accumulated absences will result in a proportional lowering of the student's grade.

25% absence will result in the student being dropped and/or failed, see the MCC official Attendance Policy statement at end of this syllabus.

## GRADING POLICY:

A student's grade will be the cumulative total of the following criteria:

70% Performance on the objectives.

30% Attendance, professional attitude and conduct, evaluated by instructor's observation.

The grading scale used in this class is:

A=90-100%

B=80-89%

C=70-79%

D=60-69%

F=BELOW 60%

## OFFICE HOURS:

I will be glad to help you outside of class time. I have regular office hours posted outside of my

office. Many times I am meeting with someone else in the studio or elsewhere during these hours, so be sure to make an appointment with me or leave a message for me with the secretary in the PAC office.

## **COMPETENCY and OBJECTIVES**

The following **competencies** outline the purposes of this course. The **objectives** are the specific activities that we will carry out.

### **Competency 1 Demonstrate the mastery of the fundamentals relating to the physics of sound pressure waves, and the auditory perception of these waves.**

- Objective: Identify the amplitude and frequency of a sound pressure wave on a wave form diagram.
- Objective: Define audio terminology. (amplitude, frequency, velocity, wavelength, frequency response, phase, harmonic content, acoustic envelope, loudness levels (db), the ear and hearing process, perception of direction and space).
- Objective: Calculate wavelength of sound pressure waves from speed of sound and the frequency.
- Objective: Diagram the acoustic envelope of transient and sustained sounds.
- Objective: Interpolate volume listening levels according to the Fletcher- Munson Curve.
- Objective: Predict phase cancellation and reinforcement of sound waves.
- Source: Class lecture \ lab, and Text chapter 2*
- Evaluation: Quiz; 80% mastery required*

### **Competency 2 Demonstrate the mastery of the fundamentals relating to the science of acoustics.**

- Objective: Contrast the differences between a recording studio's requirements for Acoustic isolation and Frequency balance.
- Objective: Explain how acoustic isolation and Frequency balance are achieved.
- Objective: Identify High-frequency and Low-frequency absorption and reflection characteristics of building materials and studio constructions.
- Source: Class lecture \ lab, and Text chapter 3*
- Evaluation: Quiz; 80% mastery required*

### **Competency 3 Evaluate by listening to effect of sound in differing acoustical environments.**

- Objective: Analyze from student 's recordings of various locations, how room design and /or acoustic environments impact the isolation, frequency balance, and absorption of sound.
- Objective: Identify direct sound, echo and reverberation.
- Source: Class lecture \ lab, and Text chapter 2 and 3*
- Evaluation: Class listening to student recorded projects, 100% mastery required*

### **Competency 4 Select and use appropriate microphones for recording sessions.**

- Objective: Define principles of microphone design and operation on a written exam.
- Objective: Define the characteristics and types of microphones on a written exam.

Objective: Identify a microphone's pattern from a polar diagram.  
Objective: Identify principles of microphone selection, placement, and stereo miking.  
Objective: Identify commonly used studio microphones.  
*Source: Class lecture \ lab, and Text chapter 4*  
*Evaluation: Quiz; 80% mastery required*

**Competency 5 Integrate the principles of analog audio recording with the necessary equipment.**

Objective: Define physical properties of analog tape.  
Objective: Define the physics of the analog tape recording process.  
Objective: Define the mechanics of analog tape equipment.  
Objective: Identify machines of differing analog tape formats and equipment from visuals.  
Objective: Clean and demagnetize different analog tape machines.  
*Source: Class lecture \ lab, and Text chapter 5*  
*Evaluation: Quiz; 80% mastery required*

**Competency 6 Integrate the principles of digital audio recording with the necessary equipment.**

Objective: Define the principles of the digital recording process.  
Objective: Define the process of digital audio editing.  
Objective: Identify digital recording machines of differing formats and storage types from visuals.  
Objective: List current storage formats and operating systems.  
Objective: Compare the advantages and disadvantages of digital and analog recording.  
*Source: Class lecture \ lab, and Text chapter 6*  
*Evaluation: Quiz; 80% mastery required*

**Competency 7 Identify the equipment and procedures used in MIDI sound production and sequencing and the synchronization of audio equipment using SMPTE/MIDI time codes.**

Objective: Identify the applications of MIDI controllers, voice modules, and sequencers.  
Objective: Understand the principles of synchronization.  
Objective: Understand the equipment used for synchronization.  
Objective: Understand the procedures for implementing synchronization principles and equipment.  
*Source: Class lecture \ lab, and Text chapter 7 and 8*  
*Evaluation: Quiz; 80% mastery required*

**Competency 8 Use amplifiers correctly to manipulate the levels for proper recording.**

Objective: Compare/Contrast the difference between preamplifiers and power amplifiers.  
Objective: Identify and place preamplifiers in the audio signal chain.  
Objective: Identify and place power amplifiers in the audio signal chain.  
Objective: define equalizers, summing amplifiers, distribution amplifiers, isolation amplifiers, impedance amplifiers, power amplifiers, voltage controlled amplifiers.

*Source:* Class lecture \ lab, and Text chapter 9

*Evaluation:* Quiz; 80% mastery required

**Competency 9 Use an audio production console to record, modify, and playback audio signals.**

Objective: Compare/Contrast the major types of professional audio consoles.

Objective: Identify and sequence the audio path through the console.

Objective: Explain how the console is used for the applications of basic tracks, overdubs and mix down.

Objective: Given a source and destination repatch an audio signal on the console.

Objective: Define console automation.

Objective: Identify the virtual console of the computer based hard disk recording system.

*Source:* Class lecture \ lab, and Text chapter 10

*Evaluation:* Quiz; 80% mastery required

**Competency 10 Explain the fundamentals of amplitude and wave shape signal processing.**

Objective: Compare the similarities and differences between amplitude and wave shape processing.

Objective: Identify the pieces of audio equipment used to manipulate the amplitude and wave shape of audio signals.

Objective: Identify different types of equalizer units, and contrast their operational characteristics.

Objective: Identify a compressor and dynamics processing equipment and fundamental controls of dynamics processors and when to use compression, limiting, expansion, keying, and ducking.

Objective: Identify when to use delays, artificial reverberation and the other types of enhancers that are used in contemporary audio production.

*Source:* Class lecture \ lab, and Text chapter 11

*Evaluation:* Quiz; 80% mastery required

**Competency 11 Identify the different types of sound reduction used in contemporary analog recording.**

Objective: Compare and contrast Dolby A, SR and DBX noise reduction.

Objective: Identify when and how to use noise gates.

*Source:* Class lecture \ lab, and Text chapter 12

*Evaluation:* Quiz; 80% mastery required

**Competency 12 Analyze and discuss the fundamental principals of loudspeaker design and construction.**

Objective: From lecture and classroom demonstrations identity the components in a loud speaker system.

Objective: Compare the advantages and disadvantages of near/field and far/field monitoring.

Objective: Apply the principles of a loud speaker system's proper selection and use to placement in the control room.

Objective: Identify loudspeaker phase linearity by listening.  
Source: *Class lecture \ lab, and Text chapter 13*  
Evaluation: *Quiz; 80% mastery required*

**Competency 13 Summarize the procedures for creating a final cassette or CD product from a studio master.**

Objective: List the steps involved in mastering a audio product in preparation for consumer media manufacture.  
Source: *Class lecture \ lab, and Text chapter 14*  
Evaluation: *Quiz; 80% mastery required*

**Competency 14 Develop the necessary skills to plan a recording session.**

Objective: Define the procedures of Recording, Overdubbing, Mixdown, Editing.  
Objective: Identify the needs of the client given a simulated recording project.  
Objective: Allocate the time and material resources necessary to successfully complete a recording session.  
Objective: Compile and complete the paperwork necessary for planning and tracking a recording session.  
Objective: Prepare the studio and setup equipment for a recording session.  
Objective: Explain the responsibility of the studio personnel.  
Source: *Class lecture \ lab, and Text chapter 15*  
Evaluation: *100% mastery required; Participation in class project.*

**Competency 15 Develop the necessary skills to execute a recording session.**

Objective: Working with a team of students, carry out a studio recording project requiring the application of knowledge and skills learned from this course.  
Objective: Identify client needs, allocate resources, complete necessary paperwork, and successfully complete three separate recording sessions involving tracking, overdubbing, and mixing.  
Objective: Perform as part of a team sharing the responsibility of the various jobs of studio personnel in actual recording sessions.  
Source: *Cumulative Class lectures \ labs, and Textbook.*  
Evaluation: *100% mastery required; Participation in all three team recording sessions, carrying out assigned tasks applying the knowledge and skills learned from this course.*

**Competency 16 Review information from audio trade periodicals.**

Objective: Summarize procedures, trends, or technical information presented in articles from trade publications.  
Source: *Audio trade periodicals (Mix magazine, EQ magazine, Electronic Musician Magazine)*  
Evaluation: *Written report; 80% mastery required, must be typed and grammatically correct.*

**Competency 17 Demonstrate professional conduct.**

Objective: Demonstrate regular attendance, promptness, adequate preparation, willingness to

volunteer, the ability to deal with difficulties, work with groups, and deal with adversity.

*Source:* Skills demonstration.

*Evaluation:* Classroom observation by instructor; 80% mastery required

name: \_\_\_\_\_

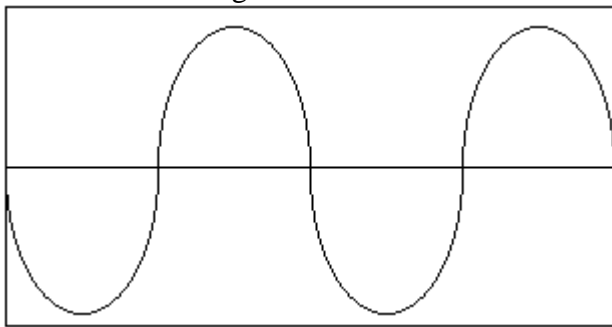
## **MUSC 1327 AUDIO ENGINEERING I Competency and Objectives Evaluation**

Instructions; Make a copy of these pages, and either write on these pages, or word-process, print and attach the information. Answer the following as completely as possible. You may write on the front and back of these pages, and add as many additional pages as necessary for your answers. Staple these pages to your other answer pages, and write your name on the top right hand corner.

The competencies that are boxed are projects and activities, and as such do not require your written response on this evaluation paper.

### **Competency 1: Demonstrate the mastery of the fundamentals relating to the physics of sound pressure waves, and the auditory perception of these waves.**

Objective 1: Identify the amplitude and frequency of a sound pressure wave on this wave form diagram.



Objective 2: Define the following:

amplitude

frequency

velocity

wavelength

frequency response

phase

harmonic content

acoustic envelope

loudness levels (db)

the ear and hearing process

perception of direction and space

Objective 3: Calculate wavelength of sound pressure waves from speed of sound and the frequency.

- A. 100 hz.
- B. 2000 hz
- C. 11 khz

Objective 4: Diagram the acoustic envelope of these transient and sustained sounds.

- A. a snare drum
  
- B. an organ note

Objective 5: According to the Fletcher- Munson Curve, what listening levels in db (SPL) are perceived as most "flat" to the human hearing apparatus?

Objective 6: When two identical audio waveforms are in phase, what will be the resultant change when they are combined?

When two identical audio waveforms are 180 degrees out of phase, what will be the resultant change when they are combined?

When two identical audio waveforms are less than 180 degrees, but more than 0 degrees out of phase, what will be the resultant change when they are combined?

*Source: Class lecture \ lab, and Text chapter 2*

*Evaluation: Quiz; 80% mastery required*

## **Competency 2: Demonstrate the mastery of the fundamentals relating to the science of acoustics.**

Objective 1: Contrast the differences between a recording studio's requirements for Acoustic isolation and Frequency balance.

Objective 2: Explain how acoustic isolation and Frequency balance are achieved in room construction.

Objective 3: Large dimensions, weight and mass will tend to have a greater impact on high frequencies or low frequencies? Why?

Small dimensions and soft surfaces will tend to have a greater impact on high frequencies or low frequencies? Why?

Convex and concave shapes have what effects on sound waves?

*Source: Class lecture \ lab, and Text chapter 3*

*Evaluation: Quiz; 80% mastery required*

class project

**Competency 3: Evaluate by listening to effect of sound in differing acoustical environments.**

Objective 1: Analyze from student 's recordings of various locations, how room design and /or acoustic environments impact the isolation, frequency balance, and absorption of sound.

Objective 2: Identify direct sound, echo and reverberation.

*Source: Class lecture \ lab, and Text chapter 2 and 3*

*Evaluation: Class listening to student recorded projects, 100% mastery required*

**Competency 4: Select and use appropriate microphones for recording sessions.**

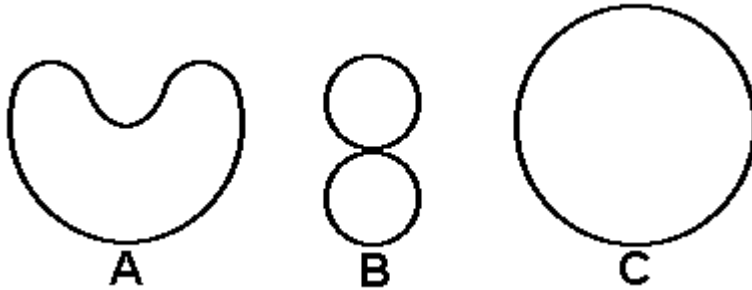
Objective 1: Define principles of microphone design and operation.

What are the components of a microphone's design?

How does a microphone transduce air motion to electron motion?

Objective 2: What are the four main types of microphones used in current audio practices?  
How do they differ in design?

Objective 3: Identify a microphone's pattern from these polar diagram.



Objective 4: Identify principles of microphone selection, placement, and stereo miking.

Objective 5: Identify commonly used studio microphones. (brand and model)

*Source: Class lecture \ lab, and Text chapter 4*

*Evaluation: Quiz; 80% mastery required*

**Competency 5: Integrate the principles of analog audio recording with the necessary equipment.**

Objective: Define the physical properties of analog tape. (what is it made from, how does it work?)

Objective: Define the physics of the analog tape recording process. (how is sound stored on tape?)

Objective: What are the 3 major components of analog recorders?

The recorder's heads are always in what order, left to right?

Objective: Outline the equipment and procedures involved in cleaning and demagnetizing analog tape machines.

*Source: Class lecture \ lab, and Text chapter 5*

*Evaluation: Quiz; 80% mastery required*

**Competency 6: Integrate the principles of digital audio recording with the necessary equipment.**

Objective: Define the principles of the digital recording process.

Objective: What is "digital audio editing" on the hard disk recorder?

Objective: List currently used types of digital recorders, storage formats and operating systems.

Objective: Compare the advantages and disadvantages of digital and analog recording.

*Source: Class lecture \ lab, and Text chapter 6*

*Evaluation: Quiz; 80% mastery required*

**Competency 7: Identify the equipment and procedures used in MIDI sound production and sequencing and the synchronization of audio equipment using SMPTE/MIDI time codes.**

Objective: Identify the applications of MIDI controllers, voice modules, and sequencers.

Objective: What is synchronization?

Objective: What equipment is necessary to synchronize studio equipment?

Objective: Describe one procedure for hooking up and using synchronization.

*Source: Class lecture \ lab, and Text chapter 7 and 8*

*Evaluation: Quiz; 80% mastery required*

**Competency 8: Use amplifiers correctly to manipulate the levels for proper recording.**

Objective: Compare/Contrast the difference between preamplifiers and power amplifiers.

Objective: In a typical recording studio, what preamplifiers will be in the audio signal chain from microphone to recorder?

Objective: Where will power amplifiers be placed in a recording studio's audio signal chain?

Objective: Define:  
equalizer

summing amplifier

distribution amplifier  
isolation amplifier  
impedance amplifiers  
power amplifiers  
voltage controlled amplifier

*Source: Class lecture \ lab, and Text chapter 9*  
*Evaluation: Quiz; 80% mastery required*

**Competency 9: Use an audio production console to record, modify, and playback audio signals.**

Objective: How does a studio recording console differ from a live sound mixer?

Objective: Put the following signal stages in the proper signal-flow order for a recording session setup:  
*monitoring    microphone    channel fader    patch bay    multi track recorder*  
*mike trim    assign buss*

Objective: Explain how the console is used for basic tracks, overdubbs and mixdown.

Objective: What is a console automation system?

Objective: What is the virtual console of the computer based hard disk recording system?

*Source: Class lecture \ lab, and Text chapter 10*  
*Evaluation: Quiz; 80% mastery required*

**Competency 10: Explain the fundamentals of amplitude and wave shape signal processing.**

Objective: What is the difference between amplitude and wave shape signal processing?

Objective: What are some pieces of audio equipment used to manipulate the amplitude and wave shape of audio signals?

Objective: Identify 3 different types of equalizer units, and contrast their operational characteristics.

Objective: Explain what a compressor does.

*Source: Class lecture \ lab, and Text chapter 11*  
*Evaluation: Quiz; 80% mastery required*

**Competency 11: Identify the different types of sound reduction used in contemporary analog recording.**

Objective: Compare and contrast Dolby A, SR and DBX noise reduction.

Objective: When would you use noise gating?

*Source: Class lecture \ lab, and Text chapter 12*  
*Evaluation: Quiz; 80% mastery required*

**Competency 12: Analyze and discuss the fundamental principals of loudspeaker design and construction.**

Objective: From lecture and classroom demonstrations identify the components in a loud speaker system.

Objective: Compare the advantages and disadvantages of near/field and far/field monitoring.

Objective: Apply the principles of a loud speaker system's proper selection and use to placement in the control room.

*Source: Class lecture \ lab, and Text chapter 13*  
*Evaluation: Quiz; 80% mastery required*

**Competency 13: Summarize the procedures for creating a final cassette or CD product from a studio master.**

Objective: List the steps involved in mastering a audio product in preparation for consumer media manufacture.

*Source: Class lecture \ lab, and Text chapter 14*  
*Evaluation: Quiz; 80% mastery required*

**Competency 14: Develop the necessary skills to plan a recording session.**

Objective: Define the procedures of Recording, Overdubbing, Mixdown, Editing.

Objective: Explain the responsibility of the;

engineer  
assistant engineer  
tape transport operator  
producer

*Source: Class lecture \ lab, and Text chapter 15*

*Evaluation: 100% mastery required; Participation in class project.  
class project*

**Competency 15: Develop the necessary skills to execute a recording session.**

Objective: Working with a team of students, carry out a studio recording project requiring the application of knowledge and skills learned from this course.

Objective: Identify client needs, allocate resources, complete necessary paperwork, and successfully complete three separate recording sessions involving tracking, overdubbing, and mixing.

Objective: Perform as part of a team sharing the responsibility of the various jobs of studio personnel in actual recording sessions.

*Source: Cumulative Class lectures \ labs, and Textbook.*

*Evaluation: 100% mastery required; Participation in all three team recording sessions, carrying out assigned tasks applying the knowledge and skills learned from this course.*

outside of class project

**Competency 16: Review information from audio trade periodicals.**

Objective: Summarize procedures, trends, or technical information presented in articles from trade publications.

*Source: Audio trade periodicals (Mix magazine, EQ magazine, Electronic Musician Magazine).*

*Evaluation: Written report; 80% mastery required, must be typed and grammatically correct.*

in class activity

**Competency 17: Demonstrate professional conduct.**

Objective: Demonstrate regular attendance, promptness, adequate preparation, willingness to volunteer, the ability to deal with difficulties, work with groups, and deal with adversity.

*Source: Skills demonstration.*

*Evaluation: Classroom observation by instructor; 80% mastery required*

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## Class Attendance Policy

Regular and punctual attendance is expected of all students, and a complete record of attendance will be kept by each instructor for the entire length of each course. Students will be counted absent from class meetings missed, beginning with the first official day of classes. Students, whether present or absent, are responsible for all material presented or assigned for a course, and will be held accountable for such materials in the determination of the course grades.

Absence from 25 percent or three consecutive weeks (whichever occurs first) of scheduled lecture and/or laboratory meetings will be taken as evidence that a student does not intend to complete the course; the student will be dropped by the instructor. The instructor may reinstate the student if satisfied that the student will resume regular attendance and will complete the course.

If the student's 25 percent absences are accumulated *before* the official drop date, the instructor will assign a grade of W. The instructor may reinstate the student if satisfied that the student will resume regular attendance and will complete the course. If the student's 25 percent absences are reached *after* the official drop date, the instructor will either assign a W, if the student is passing, or an F if the student is not passing. In extenuating circumstances, the instructor may assign a W to a student who is not passing.

Regardless of the reason for a particular absence, each absence will count toward the attendance requirements in each course. Students will be permitted to make up class work and assignments missed due to absences caused by (1) authorized participation in official College functions, (2) personal illness, or (3) an illness or a death in the immediate family. Also, the instructor has the prerogative of determining whether a student may make up work missed due to absences for other reasons. It is the student's responsibility to inform the instructor of the reason for an absence and to do so in a timely fashion.

Students enrolled in TASP mandated developmental classes must adhere to attendance guidelines as established by the developmental education department. Students who are required by TASP to take a developmental course or courses and who drop such courses to the extent that they are no longer enrolled in any developmental courses will be administratively withdrawn from all classes at the College.

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**SCANS COMPETENCIES:** All Students must master the following competencies:  
Mastery will be demonstrated by in class recording sessions, presentations and reports; performances, and/or written assignments and exams.

### **RESOURCES**

- R1: Allocates Time – demonstrated by preparation. Scheduling recording sessions and using the time properly to prepare assigned tasks to required standards.
- R2: Allocates Money – students will learn how to develop budgets for recording projects
- R3: Allocates resources and Facility Resources – students will learn how to plan Recording sessions using appropriate equipment and media.
- R4: allocates Human Resources – students will learn how to run recording sessions and how to interact with individual performing artists and of performing ensembles.

### **INFORMATION**

- IF1: Acquires & Evaluates Information- student will gather and evaluate information according to instructions using textbooks and library resources
- IF2: Organizes & Maintains Information- student will organize and maintain information according to instructions given by the instructor
- IF3: Interprets & Communicates Information – student will interpret information and communicate according to instructions
- IF4: Uses Computers to process information: use computers in the recording studio to record performances

### **INTERPERSONAL**

- IP1: Participates as a member of a team – students will learn how to function as a member of recording studio team.
- IP2: Teaching Others – students will be responsible for presenting in-class demonstrations.
- IP3: Serves Clients/Customer – Students will learn how to meet the needs of; and how to evaluate the expectations of industry clients and customers
- IP4: Exercises Leadership – students will learn how to be team leaders in in-class simulations and team activities
- IP5: Negotiates to arrive at a decision – students will learn how to negotiate contracts and interpersonal situations.

### **SYSTEMS**

- S1: Understands systems – students will demonstrate the systematic inter-relationships of the equipment in the recording studio.
- S2: Monitors & Corrects Systems – students will learn how to monitor the equipment used during a recording session and how to correct problems
- S3: Improves & Designs Systems - Students will demonstrate mastery by producing recordings that will reflect understanding of operating system of the recording studio. Students are also expected to monitors the process and improve the process at every opportunity.

### **TECHNOLOGY**

- T1: Selects Technology –students will learn to select correct technology for sessions
- T2: Applies Technology – Students will learn to select and apply the appropriate technology to performance requirements both when planning performances and during performances
- T3: Maintain & Troubleshoot Technology – students will learn to set-up complete staging of performance ensemble and how to troubleshoot related problems.