Live

AUDIO

ARTS & SCIENCES

AT TENNESSEE TECH

*A New Degree Option
Offered by The School of Music*

Curriculum Guide

Tennessee
TECH

Come join us!

1 OUR PROGRAM MISSION STATEMENT

Every performing artist needs to be supported by talented and highly trained technical artists to achieve the maximum possible performance outcome.

2 OUR COMMITMENT TO STUDENTS

Our goal is to provide students with the most comprehensive education possible in order to prepare them for future careers as audio engineers in the live performance industry.

3 WHAT MAKES OUR PROGRAM UNIQUE?

Most audio programs train students to work in recording studios, and the vast majority of instruction in these programs takes place in recording studios. Our program focuses the entire currriculum on audio for live performances. Over the last twenty-five years (because of downloadable music apps and streaming services), artists have made less income from the sale of records, and more income from the sale of concert tickets. To attract larger audiences, live shows have evolved to become stunning displays of techincal complexity—requiring sophisticated production crews with higher levels of expertise and training. Industry experts report that the availability of jobs in recording studios has plumeted, while the number of jobs available in the live audio industry has grown sharply.

4 DO YOU HAVE QUESTIONS?

If you have any questions about Live Audio Arts & Sciences at Tennessee Tech University, please feel free to contact the program director, **Dr. Eric L. Harris**. He can be reached at **eharris@tntech.edu**. Please include your name, the name of the high school you attend, and a contact phone number in the email message.

If you need immediate assistance, please feel free to call the **Tennessee Tech School of Music** office at **(931) 372–3161**.

BACHELOR OF SCIENCE IN MUSIC
LIVE AUDIO ARTS & SCIENCES OPTION

Program Overview

The B.S. degree in music with the option in live audio arts and sciences is designed to train audio engineers for careers in the live performance industry. This includes but is not limited to: sound for touring artists, sound for stage and theatrical productions, sound for large houses of worship, sound for large outdoor orchestral and operatic events, and sound for the marching arts. The degree is housed in the School of Music at Tennessee Tech University. Students will be registered as music majors and will spend a large portion of their time studying and functioning as traditional university music students. This traditional background will include four semesters of harmony and ear training; two semesters of class piano; two semesters of music appreciation/music history; seven semesters of applied instruction on a major instrument or voice (with a jury required each semester); and seven semesters of large ensemble performance. Thirty-four credit hours of electives are available in the bachelor of science in music degree. These credit hours will comprise the whole of the live audio arts and sciences curriculum and the minor in electrical/computer engineering (ECE). Some pre-requisite math courses for the electrical/computer engineering minor also satisfy general education core requirements for the university. ***The minor in electrical/computer engineering is a required part of this degree program.***

Rationale and Collaboration

Over the past three decades, a number of stunning technological advancements have been made in the field of live audio engineering. Trapezoidal speaker systems have been replaced by more efficient line arrays; analog consoles—accompanied by racks of outboard gear—have been replaced by fully digital consoles boasting high-end features previously found on only the most expensive of recording studio consoles. Large, heavy, copper cable snakes have been replaced by CAT 5/6 and fiber optic lines that connect consoles to digital snakes with studio-grade preamps. And system tuning with real time analyzers and third-octave graphic equalizers has given way to computer-based analysis and system control processors (SMAART®, FuzzMeasure®, Lake Processing®).

In the early 2000s, the development of digital downloads and streaming music led to a predictable decline in commercial album sales. Over the past two decades, artists have focused massive amounts of money and effort in their attempts to expand concert ticket sales (now the primary source of income). As a result, live concerts have become more spectacular and more technologically complex. This trend has created a need for more skilled audio engineers, technicians, and other production support personnel for these events. With this new reality in the evolving job market, new educational programs are needed to train the next generation of audio engineers for this growing field. This advanced production trend has also found its way into many larger houses of worship and even into sound design for the marching arts (drum corps and marching bands).

The collaboration of the TTU School of Music and the College of Engineering fulfills an obvious and mutually beneficial need for such a degree program at Tennessee Tech. The studio-based programs at other schools *do offer* classes in live audio—but none has combined the resources of a university music school working in collaboration with a university engineering school to offer a degree option *exclusively tailored* to the live audio engineering field.

Our degree has been developed in consultation with leaders in the live audio industry who have kindly shared their expertise and wisdom. Clair Global—the world's largest touring audio company—has been incredibly gracious and serves as our industry "north star". The close proximity of Clair's offices and warehouses in Nashville further enhances their ability to provide consultation services as our program grows and matures.

LIVE AUDIO • INTRODUCTORY LEVEL

MUSA 1001 (Fall)   **MUSA 1002 (Spring)**   2 Credit Hours Each (4 credit hours per year)

Course Description

Introductory level courses (two consecutive semesters in the freshman year) in live audio will focus on the basics of audio system design (beginning with analog console architecture and progressing to digital). This will include the interconnection and function of system components (microphones, DIs, consoles, power amps, speakers), cabling, connectors, signal impedance, gain structure, and an introduction to signal processing. Room acoustics and the properties of sound waves—including propagation, frequency, reflection and absorption—will be discussed. Concepts of sound pressure level, noise floor, sensory fatigue, threshold shift, and the basics of psychoacoustics (how the human ear perceives sound) will also be covered. Basic logarithmic function and the decibel will be covered (as a measurement of power and SPL) as well as absorption coefficients and the inverse square law. An introduction to electricity including electron motion, alternating current, direct current, volts, amps, ohms, and watts will be included (power safety will be stressed). A *very* basic introduction to the components of electrical circuitry will also be introduced including resistors, capacitors, inductors, and switches. The function and application of band pass filters (high pass, low pass, and fixed and parametric EQ) will be introduced. The essentials of hearing health for audio engineers and performing artists will also be introduced and stressed. Theatrical stage terminology will also be taught. Students will be introduced to a variety of shop tools and trained in their safe use (this will include soldering for professional audio). Students will be taught to load, unload, set-up, tear-down, and transport professional grade audio equipment for live performances.

Laboratory Requirement

Students will be required to complete a minimum of thirty-five laboratory hours per semester in association with the classroom portion of these courses. These laboratory hours will be spent assisting with the production of various events for the School of Music on and off campus. Laboratory hours may also be spent in the maintenance and inventory of school audio equipment (at the instructor's discretion).

Grading

Student grading will be determined by class attendance and participation, written reports based upon reading and online video assignments, the keeping of a course notebook, successful completion of written tests, and the successful completion of required laboratory hours. A final exam will be required for all students.

Student Role for Production Events

First year students will assist older students (and the program director) with the load-in, set-up, tear-down, and load-out of production events for the School of Music on and off campus. Emphasis on professional collaboration as well as personal and crew safety will be stressed.

Co-Requisites

Harmony 1 and 2; Aural Techniques 1 and 2.

Instructional Method

Lecture and hands-on instruction in class as well as at-event instruction (see/do). Students will also have online video-based assignments (watching and critical listening) that will be required.

SOPHOMORE YEAR • LIVE AUDIO ARTS & SCIENCES • INTERMEDIATE

LIVE AUDIO • INTERMEDIATE LEVEL
MUSA 2001 (Fall)　　　　**MUSA 2002 (Spring)**　　2 Credit Hours Each (4 credit hours per year)

Course Description
Intermediate level courses (two consecutive semesters in the sophomore year) in live audio will focus on the operation of more complex audio systems. Students will be guided in the development of critical listening skills for audio mixing. Students will also be trained to provide audio support for the marching arts. Microphone selection and placement will be discussed as well as polarity patterns and their application in live audio settings (reinforcement and recording). Active versus passive speaker systems will be discussed as well as loudspeaker design and application (point source versus line arrays, ground-stacked versus flown speaker systems, polymer based cabinets versus wood and wood products). Acoustical measurement and the basics of system tuning using computer-based systems (SMAART®) will be introduced. Students will be taught to perform power and circuit measurements using digital multi-meters. Students will be introduced to crossovers (active and passive—including frequency selection for specific speakers/cabinets). Students will be taught to use parametric EQ, compressors, and gates for enhanced audio mixing. Students will also be taught to use digital effects (primarily delay and reverb) for enhanced audio mixing. Stage layout and audio system design for live events will be discussed (as well as techniques for sonic separation among performers). Students will be introduced to wireless microphones and the basics of RF technology. Students will also be introduced to the basics of monitor mixing for performer support. The course will stress the importance of building positive professional relationships among crew members and performing artists. ***Please Note:*** *A list of recommendations will be provided so that students who wish to do so may begin to assemble their own set of small tools and purchase a professional grade digital multi-meter.*

Laboratory Requirement
Students will be required to complete a minimum of thirty-five laboratory hours per semester in association with the classroom portion of these courses. These laboratory hours will be spent assisting with the production of various events for the School of Music on and off campus. Laboratory hours may also be spent in the maintenance and inventory of school audio equipment (at the instructor's discretion).

Grading
Student grading will be determined by class attendance and participation, written reports based upon reading and online video assignments, the keeping of a course notebook, successful completion of written tests, and the successful completion of required laboratory hours. A final exam will be required for all students.

Student Role for Production Events
Second year students will assist older students (and the program director) with the load-in, set-up, tear-down, and load-out of production events for the School of Music on and off campus. Emphasis on professional collaboration as well as personal and crew safety will be stressed.

Pre-Requisites
Successful completion of MUSA 1001 and MUSA 1002 with a grade of C or higher.

Instructional Method
Lecture and hands-on instruction in class as well as at-event instruction (see/do). Students will also have online video-based assignments (watching and critical listening) that will be required.

JUNIOR YEAR • LIVE AUDIO ARTS & SCIENCES • ADVANCED

LIVE AUDIO • ADVANCED LEVEL
MUSA 3001 (Fall)   **MUSA 3002 (Spring)**   3 Credit Hours Each (6 credit hours per year)

Course Description

Advanced level courses (two consecutive semesters in the junior year) in live audio will focus on the operation of complex audio systems. Students will continue to develop critical listening skills essential for successful audio mixing. Students will be introduced to in-ear and advanced monitor mixing for performer support. Advanced miking techniques for musical theater will be discussed. Advanced RF topics will also be discussed (including equipment selection, antenna options, distribution amps, venue frequency scanning and frequency assignment—using applications such as Wireless Workbench®). Students will be introduced to AC power distribution systems—with heavy emphasis on power safety for crew and performers. Students will be introduced to the essentials of rigging safety. The process of system troubleshooting and on-site repair will be taught. Students will be taught advanced EQ and compression techniques for enhanced audio mixing. (Emphasis will be placed on achieving a musically appealing mix that the audience will enjoy and the performers will appreciate.) The layering of varied performance elements in an audio mix will also be discussed. Miking of non-traditional instruments (world music) will be discussed. Students will be introduced to Ableton® and MainStage® digital audio workstations. Students will be introduced to live performance recording techniques (DECCA/ORTF) and trained in the use of Pro Tools® for live recording applications.

Laboratory Requirement

Students will be required to complete a minimum of thirty-five laboratory hours per semester in association with the classroom portion of these courses. These laboratory hours will be spent assisting with the production of various events for the School of Music on and off campus. Laboratory hours may also be spent in the maintenance and inventory of school audio equipment (at the instructor's discretion).

Grading

Student grading will be determined by class attendance and participation, written reports based upon reading and online video assignments, the keeping of a course notebook, successful completion of written tests, and the successful completion of required laboratory hours. A final exam will be required for all students.

Student Role for Production Events

Third year students will assist fourth year students (and the program director) with the planning, load-in, set-up, operation/production, tear-down, and load-out of production events for the School of Music on and off campus. Third year students will also serve as peer-mentors to first and second year students in the live audio engineering program. Emphasis on professional collaboration as well as personal and crew safety will be stressed. Third year students *may* be assigned smaller production events to independently plan, supervise, and mix without the supervision of a faculty member.

Pre-Requisites

Successful completion of MUSA 2001 and MUSA 2002 with a grade of C or higher.

Instructional Method

Lecture and hands-on instruction in class as well as at-event instruction (see/do). Students will also have online video-based assignments (watching and critical listening) that will be required.

SENIOR YEAR • LIVE AUDIO ARTS & SCIENCES • PROFESSIONAL

LIVE AUDIO • PROFESSIONAL LEVEL

MUSA 4001 (Fall)   **MUSA 4002 (Spring)**   3 Credit Hours Each (6 credit hours per year)

Course Description

Professional level courses (two consecutive semesters in the senior year) in live audio will focus on the expert design, operation, troubleshooting, and maintenance of complex audio systems. Students will demonstrate the highest levels of critical listening skills essential for professional audio mixing. Emphasis will be placed on combining all previously learned concepts and skills to produce professional quality live audio events (FOH and monitors). Large audio system design will be discussed and students will be introduced to acoustic simulation and loudspeaker modeling software (EASE Focus®). The planning and management of live events—with their technical specifications and crews will be discussed. The roles of front of house engineer, monitor engineer, system engineer, and stage techs will be reviewed from a management perspective. Orchestral miking for sound reinforcement will be taught. Students will also discuss the design and installation of fixed audio systems (system integration)—including system flexibility requirements and venue structural and power needs. Students will be taught to read basic venue blueprints. Students will also begin preparations for entry into the professional world upon graduation. Topics of discussion will include applying for jobs, "earning your stripes and paying your dues", professional organizations (IATSE, AES, House Ear Institute), and continuing education opportunities (workshops and certification programs). Tour/travel etiquette for road crews will also be discussed.

Laboratory Requirement

Students will be required to complete a minimum of thirty-five laboratory hours per semester in association with the classroom portion of these courses. These laboratory hours will be spent assisting with the production of various events for the School of Music on and off campus. Laboratory hours may also be spent in the maintenance and inventory of school audio equipment (at the instructor's discretion).

Grading

Student grading will be determined by class attendance and participation, written reports based upon reading and online video assignments, the keeping of a course notebook, successful completion of written tests, and the successful completion of required laboratory hours. A final exam will be required for all students.

Student Role for Production Events

Fourth year students will lead younger students and assist the program director with the planning, load-in, set-up, operation/production, tear-down, and load-out of production events for the School of Music on and off campus. Fourth year students will also serve as peer-mentors to third year students in the live audio engineering program. Emphasis on professional collaboration as well as personal and crew safety will be stressed. Fourth year students *will* be assigned smaller production events to independently plan, supervise, and mix without the supervision of a faculty member.

Pre-Requisites

Successful completion of MUSA 3001 and MUSA 3002 with a grade of C or higher.

Instructional Method

Lecture and hands-on instruction in class as well as at-event instruction (see/do). Students will also have online video-based assignments (watching and critical listening) that will be required.

MATH TRACK OPTIONS

Students in the Live Audio Arts and Sciences degree option will earn a minor in electrical/computer engineering (ECE) as a required component of the degree. Courses in electrical/computer engineering require advanced mathematics—Calculus 1 and Calculus 2.

To maximize the potential for student success in advanced math courses, two approach tracks have been developed. Students entering the Live Audio Arts and Sciences degree option will be asked to take the Accuplacer Math Exam. The Accuplacer Math Exam score and the student's ACT score will be used to determine which math track the student should follow.

Students who score a 260–300 on the Accuplacer Math Exam and have an ACT score of 27+ will follow Math Track 2.

Students who score below 260 on the Accuplacer Math Exam or have an ACT score lower than 27 will follow Math Track 1.

Both math tracks lead to an earned minor in electrical and computer engineering and do not require extra semesters of coursework prior to graduation. One track is simply for students who are more confident in math and have had advanced mathematics in high school; the other is for students who need a thorough review of algebra and trigonometry before beginning Calculus 1.

MATH TRACK 1

Math Accuplacer Score below 260.
ACT Score below 27.

Math Track 1 is designed for students who need extra preparation in mathematics before taking Calculus 1. This track requires students to take Math 1710 (Pre-Calculus Algebra) in the fall semester of the freshman year, and Math 1720 (Pre-Calculus Trigonometry) in the spring semester of the freshman year. Both classes must be passed with a minimum grade of C before progressing to Calculus 1.

Any student in the Live Audio Arts and Sciences degree option may choose to follow Math Track 1—even if their Accuplacer and ACT scores would allow them to enter Math Track 2.

MATH TRACK 2

Math Accuplacer Score of 260–300.
ACT Score of 27+.

Math Track 2 is designed for students who are stronger in mathematics. These students have typically taken calculus in high school—either as an Advanced Placement® course, or as part of a dual enrollment program at a community college. Students who place into Math Track 2 are not required to take Pre-Calculus Algebra or Pre-Calculus trigonometry. Students in Math Track 2 can take Calculus 1 during the fall semester of the freshman year and Calculus 2 during the spring semester of the freshman year.

THE ELECTRICAL/COMPUTER ENGINEERING (ECE) MINOR

The minor in electrical/computer engineering *is a required part* of the Live Audio Arts & Sciences degree option at Tennessee Tech. Students will be allowed to choose one of two ECE minors.

ECE Minor Track 1 provides a solid background in the fundamentals of electrical and computer engineering. *ECE Minor Track 1 requires Calculus 1 and Calculus 2.* **Students who place in Math Track 1 must follow ECE Minor Track 1**.

ECE Minor Track 2 provides a more specialized minor in electrical and computer engineering that can uniquely benefit future audio engineers. *ECE Minor Track 2 requires one additional advanced math course—Differential Equations—to be taken after Calculus 1 and Calculus 2.* **Students who place in Math Track 2 may choose ECE Minor Track 2 or ECE Minor Track 1.**

COURSES BY SEMESTER • MATH TRACK 1/ECE MINOR TRACK 1

FRESHMAN YEAR

Fall Semester

MUS 1120	Harmony I	3
MUS 1130	Aural Techniques I	1
MUS 1011	Beginning Class Piano I	1
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
ENGL 1010	Writing I[3]	3
MATH 1710	Pre-Calculus Algebra[4]	3
MUSA 1001	Live Audio Introductory A	2

Semester Credit Hours Total 15

Spring Semester

MUS 1140	Harmony II	3
MUS 1150	Aural Techniques II	1
MUS 1012	Beginning Class Piano II[9]	1
MUS 1030	MAMM[2]	3
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
ENGL 1020	Writing II[3]	3
MATH 1720	Pre-Calculus Trigonometry	(3) *(pre-requisite)*
MUSA 1002	Live Audio Introductory B	2

Semester Credit Hours Total 18

SOPHOMORE YEAR

Fall Semester

MUS 2110	Harmony III	2
MUS 2120	Aural Techniques III	1
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
ENGL 2130	English Gen. Ed. Core[6]	3
MATH 1910	Calculus 1	4
MUSA 2001	Live Audio Intermediate A	2

Semester Credit Hours Total 14

Spring Semester

MUS 2130	Harmony IV	2
MUS 2140	Aural Techniques IV	1
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	Natural Science[7] (Physics 2010)	4 *(Acoustics)*
MATH 1920	Calculus 2	4
MUSA 2002	Live Audio Intermediate B	2

Semester Credit Hours Total 15

Notes

1. Live Audio students will attend scheduled repertory classes in audio. When the audio repertory class is not in session, students may attend the repertory class for their applied instrument—but are not required to do so. Students may also perform in studio ensembles with the permission of the Live Audio Program Director and the Applied Studio Professor.
2. MUS 1030, Music Appreciation for Music Majors (MAMM), also satisfies the Humanities/Fine Arts Elective requirement shown in the fall semester of the senior year.
3. English must be taken in consecutive semesters beginning with the fall semester of the freshman year.
4. Students must take a mathematics course no later than the second semester of the freshman year.
5. Live Audio students will receive recital attendance credit for all concerts they work as crew.
6. It is recommended that Live Audio students take American Literature to satisfy the English General Education Core requirement in the fall semester.
7. Live Audio majors *must take* Physics 2010 to satisfy the Natural Science General Education Core requirement in the spring semester. *This will be a special Acoustics course created by the Physics Department.*
8. Students must make a grade of C or better in all courses assigned to the major degree program.
9. Live Audio students must take Piano I and Piano II. They are not required to take Piano III and Piano IV.

COURSES BY SEMESTER • MATH TRACK 1/ECE MINOR TRACK 1

JUNIOR YEAR

Fall Semester

MUS 1013	Recital Class[3]	0
MUS 3XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	SPCH 2410 or PC 2500	3
Gen. Ed. Core	Natural Science[8] (Chemistry 1010)	4
ECE 2140	Intro to Digital Systems	4
MUSA 3001	Live Audio Advanced A	3

Semester Credit Hours Total 16

Spring Semester

MUS 3020	Music History and Literature II	3
MUS 1013	Recital Class[3]	0
MUS 3XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	Social/Behavioral Sciences	3
CSC1300	Intro to Problem Solving and Computer Programming	4
ECE 3140	Digital System Design	3
MUSA 3002	Live Audio Advanced B	3

Semester Credit Hours Total 18

SENIOR YEAR

Fall Semester

MUS 1013	Recital Class[3]	0
MUS 3XXX	Private Lesson[1,6]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	Humanities/Fine Arts Elective[2]	(3)
HIST 2010	American History I	3
ECE 2050	Circuits and Electronics I (with Lab)	4
MUSA 4001	Live Audio Professional A	3

Semester Credit Hours Total 15

Spring Semester

MUS 1013	Recital Class[3]	0
MUS 4010	Senior Project[4]	1
HIST 2020	American History II	3
Gen. Ed. Core	Social/Behavioral Sciences	3
ECE 3130	Microcomputer Systems (with Lab)	4
MUSA 4002	Live Audio Professional B	3

Semester Credit Hours Total 14

Notes

1. Live Audio students will attend scheduled repertory classes in audio. When the audio repertory class is not in session, students may attend the repertory class for their applied instrument—but are not required to do so. Students may also perform in studio ensembles with the permission of the Live Audio Program Director and the Applied Studio Professor.
2. MUS 1030, Music Appreciation for Music Majors (MAMM), also satisfies the Humanities/Fine Arts Elective requirement shown in the fall semester of the senior year.
3. Live Audio students will receive recital attendance credit for all concerts they work as crew.
4. Live Audio students will complete a Senior Project under the supervision of the program director.
5. Students must make a grade of C or better in all courses assigned to the major degree program.
6. Live Audio students *will not be required* to perform a senior recital.
7. Live Audio students who do not finish the degree in eight semesters will be required to perform with a major ensemble each semester they remain in school. They *will not be required* to take an applied lesson.
8. Live Audio students *must take* Chemistry 1010 to satisfy the Natural Science General Education Core requirement in the fall semester.
9. Live Audio students *will not take an applied lesson or play in an ensemble* during the spring semester of the senior year.

COURSES BY SEMESTER • MATH TRACK 2/ECE MINOR TRACK 2

FRESHMAN YEAR

Fall Semester

MUS 1120	Harmony I	3
MUS 1130	Aural Techniques I	1
MUS 1011	Beginning Class Piano I[8]	1
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
ENGL 1010	Writing I[3]	3
MATH 1910	Calculus 1[4]	4
MUSA 1001	Live Audio Introductory A	2
Semester Credit Hours Total		**16**

Spring Semester

MUS 1140	Harmony II	3
MUS 1150	Aural Techniques II	1
MUS 1012	Beginning Class Piano II[8]	1
MUS 1030	MAMM[2]	3
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
ENGL 1020	Writing II[3]	3
MATH 1920	Calculus 2	4
MUSA 1002	Live Audio Introductory B	2
Semester Credit Hours Total		**19**

SOPHOMORE YEAR

Fall Semester

MUS 2110	Harmony III	2
MUS 2120	Aural Techniques III	1
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
ENGL 2130	English Gen. Ed. Core[6]	3
MATH 2120	Differential Equations	3
MUSA 2001	Live Audio Intermediate A	2
Semester Credit Hours Total		**13**

Spring Semester

MUS 2130	Harmony IV	2
MUS 2140	Aural Techniques IV	1
MUS 1013	Recital Class[5]	0
MUS 1XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	Social/Behavioral Sciences	3
ECE 2140	Intro to Digital Systems	4
MUSA 2002	Live Audio Intermediate B	2
Semester Credit Hours Total		**14**

Notes

1. Live Audio students will attend scheduled repertory classes in audio. When the audio repertory class is not in session, students may attend the repertory class for their applied instrument—but are not required to do so. Students may also perform in studio ensembles with the permission of the Live Audio Program Director and the Applied Studio Professor.
2. MUS 1030, Music Appreciation for Music Majors (MAMM), also satisfies the Humanities/Fine Arts Elective requirement shown in the fall semester of the senior year.
3. English must be taken in consecutive semesters beginning with the fall semester of the freshman year.
4. Students must take a mathematics course no later than the second semester of the freshman year.
5. Live Audio students will receive recital attendance credit for all concerts they work as crew.
6. It is recommended that Live Audio students take American Literature to satisfy the English General Education Core requirement in the fall semester.
7. Students must make a grade of C or better in all courses assigned to the major degree program.
8. Live Audio students must take Piano I and Piano II. They are not required to take Piano III and Piano IV.

COURSES BY SEMESTER • MATH TRACK 2/ECE MINOR TRACK 2

JUNIOR YEAR

Fall Semester

MUS 1013	Recital Class[3]	0
MUS 3XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	SPCH 2410 or PC 2500	3
Gen. Ed. Core	Natural Science[8] (Chemistry 1010)	4
CSC 1300	Introduction to Problem Solving and Computer Programming	4
MUSA 3001	Live Audio Advanced A	3
Semester Credit Hours Total		**16**

Spring Semester

MUS 3020	Music History and Literature II	3
MUS 1013	Recital Class[3]	0
MUS 3XXX	Private Lesson[1]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	Natural Science[9] (Physics 2010) *(Acoustics)*	4
ECE 2050	Circuits and Electronics 1 (with Lab)	4
MUSA 3002	Live Audio Advanced B	3
Semester Credit Hours Total		**16**

SENIOR YEAR

Fall Semester

MUS 1013	Recital Class[3]	0
MUS 3XXX	Private Lesson[1/6]	1
MUS 10XX	Major Ensemble	1
Gen. Ed. Core	Humanities/Fine Arts Elective[2]	③
HIST 2010	American History I	3
ECE 3130	Microcomputer Systems (with Lab)	4
MUSA 4001	Live Audio Professional A	3
Semester Credit Hours Total		**15**

Spring Semester

MUS 1013	Recital Class[3]	0
MUS 4010	Senior Project[4]	1
HIST 2020	American History II	3
Gen. Ed. Core	Social/Behavioral Sciences	3
ECE 4140[10]	Embedded System Design	3
MUSA 4002	Live Audio Professional B	3
Semester Credit Hours Total		**13**

Notes

1. Live Audio students will attend scheduled repertory classes in audio. When the audio repertory class is not in session, students may attend the repertory class for their applied instrument—but are not required to do so. Students may also perform in studio ensembles with the permission of the Live Audio Program Director and the Applied Studio Professor.

2. MUS 1030, Music Appreciation for Music Majors (MAMM), also satisfies the Humanities/Fine Arts Elective requirement shown in the fall semester of the senior year.

3. Live Audio students will receive recital attendance credit for all concerts they work as crew.

4. Live Audio students will complete a Senior Project under the supervision of the program director.

5. Students must make a grade of C or better in all courses assigned to the major degree program.

6. Live Audio students *will not be required* to perform a senior recital.

7. Live Audio students who do not finish the degree in eight semesters will be required to perform with a major ensemble each semester they remain in school. They *will not be required* to take an applied lesson.

8. Live Audio students *must take* Chemistry 1010 to satisfy the Natural Science General Education Core requirement in the fall semester.

9. Live Audio students *must take* Physics 2010 to satisfy the Natural Science General Education Core requirement in the spring semester. *This will be a special Acoustics course created by the Physics Department.*

10. Live Audio students *will not take an applied lesson or play in an ensemble* during the spring semester of the senior year.

11. The following classes may be substituted for ECE 4140, depending on the student's interest. Both classes require Differential Equations as a pre-requisite. Choosing either of these options will result in a spring semester credit hour total of 14—rather than the 13 shown above.

CHOOSE ONE:		
ECE 3050	Circuits and Electronics II (with Lab)	4 Credits
ECE 3330	Signals and Systems (with Lab)	4 Credits

COMPARING COURSE DISTRIBUTION PER TRACK OPTION

MATH/ECE TRACK 1

Music Classes .... 37 Hours
General Education Classes (Including Chemistry,
    Acoustics, and Pre–Calculus Algebra) .... 38 Hours
Advanced Math Classes (Calculus)......................8 Hours
Live Audio Classes... 20 Hours
Electrical/Computer Engineering Classes ...... 19 Hours

Total Degree Credit Hours ....122 Hours

MATH/ECE TRACK 2

Music Classes .... 37 Hours
General Education Classes (Including Chemistry,
    Acoustics, and Pre–Calculus Algebra) .... 38 Hours
Advanced Math Classes (Calculus)......................8 Hours
Live Audio Classes... 20 Hours
Electrical/Computer Engineering Classes ...... 19 Hours

Total Degree Credit Hours ....122 Hours

ADMISSIONS CHECKLIST FOR LIVE AUDIO ARTS & SCIENCES

Students who are interested in pursuing the B.S. in Music with the degree option in Live Audio Arts and Sciences degree should:

1. ☐ Be enrolled in your high school band, choir, or orchestra program for a minimum of four consecutive years <u>or</u> have taken *weekly* private piano, guitar, or voice lessons for a minimum of four consecutive years. The Live Audio Arts and Sciences program is housed in the School of Music at Tennessee Tech and students will be registered as music majors.
2. ☐ Contact the program director, Dr. Eric L. Harris, and schedule a campus visit. **eharris@tntech.edu**
3. ☐ Take the ACT. A minimum composite score of 22 is recommended for students seeking to enter The Live Audio Arts and Sciences Program.
4. ☐ Complete an application for admission to Tennessee Tech University. (The earlier, the better.)
5. ☐ Complete a scholarship application for Tennessee Tech University. ***This application is separate from the application for admission to the university.*** In order to be eligible for scholarship awards, this application must be completed in ScholarWeb.
6. ☐ Schedule a scholarship audition for the School of Music in the spring semester of your senior year. The dates for these auditions are posted on the School of Music web page. **tntech.edu/music**

PHYSICAL SAFETY

The field of live audio requires physical stamina, working long hours, and the ability to individually lift loads of up to forty pounds to chest height. Students must be able to follow highly specific instructions, to move and to think quickly, to readily accept constructive criticism, to communicate clearly, and to work well with others. Students who pursue the B.S. in Music with an option in Live Audio Arts and Sciences will frequently be required to participate in the set–up and tear–down of large, sometimes heavy audio equipment—including staging, line array towers, large road cases, rigging, and cabling. You will also be required to load and unload large trucks as a member of a crew, and to work safely with load control bars, cargo ramps, large rolling platforms, and hydraulic lifts. (Students must be able to climb steep stairs and ladders.) Students will be exposed to sound equipment that can produce high sound pressure levels (loud volume) and may be required to wear hearing protection in some environments. Hard hats may be required when audio or lighting equipment is being "flown" (suspended overhead by motors, chains, trusses, and spansets). Students will also be taught to work safely with, and in close proximity to, AC power distribution systems for live audio and lighting equipment (including fueled generators).

RECOMMENDATIONS FOR PERSONAL TOOLS

It is recommended that Live Audio students begin to assemble a personal collection of quality tools and meters as they move through the program. Most of these tools, with proper care, will last a lifetime and will serve as the beginning of a fine professional collection. Tools do not have to be purchased before starting the program. In fact, it is recommended that students complete the first year *before* beginning to assemble a personal tool collection. Any of these items will make a great addition to your holiday or birthday wish lists. All of these items can be found online. Prices given are those posted on Amazon just prior to the printing of this document. Some of these items might also be in stock at local hardware or home goods stores.

- Toughbuilt 12" Massive Mouth Bag, Black/Yellow. A superb basic tool bag. ($39.99 Amazon)

- Whirlwind MCT7 Cable Tester. Designed to test most of the cable types used in professional audio. ($157.00 Amazon)

- Fluke 117 Digital Multimeter. An essential tool for any basic electronics work. ($207.38 Amazon)

- LTGEM Hard Case for Fluke 117. A hardshell protective case for your Fluke 117 meter. ($13.59 Amazon)

- Irwin Vise-Grip Lineman's Pliers, 9 1/2 inch. ($17.99 Amazon)

- Klein Tools 11055 Wire Cutter and Wire Stripper. ($19.99 Amazon)

- Knipex High Leverage, Diagonal Cut Pliers, 5.5 inch. ($27.44 Amazon)

- Irwin Vise-Grip Adjustable Wrench Set, SAE 6-inch and 10 inch, 2-piece (2078700), Blue. ($26.73 Amazon)

- ChannelLock HD-1 Ultimate 4-Piece Pliers Set. Includes Tongue & Groove, Diagonal Cutting, Long Nose, and Slip Joint Pliers. ($54.95 Amazon)

- Wera 3334 Kraftform Stainless Steel Lasertip Slotted Screwdriver, 1.2x8.0x175mm. ($25.86 Amazon)

- Wera 05032022001 Kraftform Stainless Steel, Lasertip, Phillips Screwdriver, PH2 Head, 4" Blade Length. ($22.43 Amazon)

- Wera 05032032001 Kraftform Stainless PZ Pozidriv Screwdriver, Lasertip, PZ2 Head, 4" Blade Length. ($15.57 Amazon)

- Craftsman CMHT65047 CFT SD Acetate – 2 piece Pocket Set (1/8-inch x 2.5-inch slotted and PH #0 x 2.5-inch Phillips). ($3.98 Amazon)

- Fiskars CarbonMax Folding Utility Knife, Length 17 cm, Stainless Steel Blade. ($28.95 Amazon)

- Four-AM Fingerless Mechanic Gloves, Shock Grip. ($11.99 per pair—must specifiy sex/size—Amazon) *Any weight lifting glove with padded palms and exposed fingertips can be used. You can visit local sporting goods stores to examine different brands.*

- Crescent Lufkin 1" x 25' Hi-Viz Blue Quickread Yellow Clad Tape Measure. ($11.15 Amazon)

- XSHEAR 7.5" Extreme Duty Trauma Shears. ($39.95 Amazon)

- Yamaha HPH-MT8 Monitor Headphones, Black. ($199.00 Amazon)

- 3M Peltor X4A Over-The-Head Ear Muffs, Noise Protection, NRR 27 dB. ($33.74 Amazon)

RECOMMENDATIONS FOR PERSONAL COMPUTERS

The recommendations below are given by the College of Engineering and will work well as an entry level computer. Some additional software may be required later for students in the Live Audio Arts & Sciences Program.

MICROSOFT WINDOWS LAPTOPS

- Processor: Intel Core i5 processor or equivalent.
- Memory: 8GB RAM (16GB strongly recommended).
- Storage: 1TB solid state drive (SSD) or more strongly recommended.
- Nvidia graphics recommended. Video: 1920 x 1080 resolution. 4k displays may have to be operated at a lower screen resolution to be compatible with some software. Several departments will make use of SolidWorks. There have been some reported issues of graphics cards not being compatible with this program. Students can consult **https://www.solidworks.com/support/hardware-certification** for a list of tested and certified graphics cards for SolidWorks.
- Operating System: Microsoft Windows 11.

APPLE MACINTOSH LAPTOPS

- Processor: Intel Laptops with i5 and above. M1 Laptops (Warning: not all software is compatible).
- Memory: 8GB RAM (16GB strongly recommended—especially if you plan to also run Windows).
- Storage: 500GB solid state drive (SSD). 1TB SSD strongly recommended.
- Video: 1920 x 1080 resolution with minimum screen size of 13 inches. (15 inches is probably better or access to an external monitor.) Several departments will make use of SolidWorks. There have been some reported issues of graphics cards not being compatible with this program. Students may want to consult **https://www.solidworks.com/support/hardware-certification** for a list of tested and certified graphics cards for SolidWorks.
- Operating System: Catalina 10.15 or later.

RECOMMENDED ACCESSORIES

- Laptops with only USB-C or Thunderbolt ports will likely require a dongle for easier compatibility with USB-3 on campus.
- USB flash drive (64GB or higher).
- USB external hard drive (500GB or higher).
- A mouse may be preferred over a trackpad by some students. Any brand will suffice.

IMPORTANT!

Computer models and specifications change frequently. Please check with Dr. Harris or the Department of Electrical Engineering before making any computer purchases.

notes