Multi Track Mixing and Mastering

Content Area: **Practical Arts**
Course(s): **Music Recording & Engineering**
Time Period: **Marking Period 2**
Length: **3-4 weeks**
Status: **Published**

Course Pacing Guide

Unit	MP	Weeks
Physics Of Sound	1	2-3
Logic Pro Introduction (Digital Audio Software)	1	2-3
Microphones and Recording	1	3-4
MIDI Recording/Editting	1	2-3
Multi Track Recording	2	2
Mutli tack Mix/Mastering	2	3-4
Foley Cinema Sound Production	2	3-4
Live Sound	2	2-3

Unit Overview

Introduction to FX editing tools (plug ins) in a DAW.

The process of editing and enhancing audio files.

Enduring Understandings

- Having a working knowledge of FX plug ins and how to use them in enhancing an audio file.
- Having an undertsanding of how create a master file from a multi track project.

- Having a working knowledge of preparing a master track for broadcast and public use.

Essential Questions

- Which FX plug ins are best in cleaning and improving various audio files (bass, drums, vocals etc)?
- How can one multiple tracks into a single master track?
- What qualities of sound within an audio file are needed in order for it to be broadcast ready?

New Jersey Student Learning Standards (No CCS)

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.

Amistad Integration

Large Group Discussion/Listening Analysis:

- Discuss the life and career of:
- Wondagurl
- DJ Jazzy Jeff
- DJ Kool Herc

LA.RI.11-12.10b	By the end of grade 12, read and comprehend literary nonfiction at grade level text-complexity or above.
SEL.PK-12.1.2	Recognize the impact of one's feelings and thoughts on one's own behavior

Holocaust/Genocide Education

Large Group Discussion/Listening Analysis:

- Discuss the life and career of famous Jewish american sound engineers/musicians:

- Elliott Scheiner
- Benny Goodman
- Adam Sandler

Interdisciplinary Connections

VPA.1.1.12	All students will demonstrate an understanding of the elements and principles that govern the creation of works of art in dance, music, theatre, and visual art.
VPA.1.1.12.B.CS1	Understanding nuanced stylistic differences among various genres of music is a component of musical fluency. Meter, rhythm, tonality, and harmonics are determining factors in the categorization of musical genres.
CAEP.9.2.12.C	Career Preparation
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Technology Standards

TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.2.12.D.5	Explain how material processing impacts the quality of engineered and fabricated products.
TECH.8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.
TECH.8.2.12.D.CS1	Apply the design process.

21st Century Themes/Careers

HPE.2.2.8.A.2	Demonstrate the use of refusal, negotiation, and assertiveness skills when responding to peer pressure, disagreements, or conflicts.

CAEP.9.2.12.C	Career Preparation
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Financial Literacy Integration

1. The State Board of Education shall require that a school district incorporate in each of the grades [1][kindergarten] six[1] through eight financial literacy instruction to pupils enrolled in those grades. The purpose of the instruction shall be to provide [1][elementary and][1]middle school students with the basic financial literacy necessary for sound financial decision-making.

The instruction shall meet the requirements established by the State board and shall:

a. be appropriate to, and reflect the age and comprehension of, the students enrolled in the particular grade level; and

b. include content on budgeting, savings, credit, debt, insurance, investment, and other issues associated with personal financial responsibility as determined by the State board.

Instructional Strategies & Learning Activities

- **Instructional strategies include:**
- Large group discussion/demonstration
- Partner work in editing audio files using FX plug ins.
- Individual project based instruction.

- **Multi-Track Mixing and editing**
    - Mixing is taking a multi-track recording project and creating 1 master file out of many files.

Signal Processing

An audio signal that is not processed is a **dry** signal. An audio signal that is processed is a **wet** signal.

I. **Basics**

1. Digital Sound: In order for an analog sound to become a digital sound, it first must be converted. We use an "A/D" – *Analog to Digital Converter* to do this. When a sound passes through a microphone and into a computer (Digital Audio Workstation), it is first processed in the A/D.
2. Bit Depth and Sample Rate

i.Bit Depth = Size of an audio sample in binary digits. Usually 16 bits, 24 bits, 32 bits or 64 bits) The larger the bit depth, the more accurate the sound sample hence to closer the digital sound is to the original analog sound.

ii.Sample Rate = the number of times a sample is per second. This is noted in kHz. (The Standard CD Sample rate is 44.1 KHz. The standard DVD sample rate is 96 kHz.) The higher the sample rate, the more accurate the digital sound will be to the original analog sample.

1. The process

i.The sound passes through the microphone. This causes a vibration which is transferred into electric voltage and passed through a microphone cable to a sound card (A/D).

ii.In the Sound Card (A/D) 2 things take place:

1. The sound is *sampled* – Sample rate takes an audio sample of the analog sound.
2. The sound is *quantized* – The sample is measured against the Bit rate

iii.This creates a digital reproduction of the analog sound. This digital sound signal is sent to the DAW (Digital Audio Workstation) for processing.

II. **Types of audio signal processors:**

1. **Analog**

i.Older types of processing. The audio recording itself was altered by means of an external source (distortion box, Wah Wah pedal etc.)

1. **Digital**

i.Known as **DSPs** (Digital signal processor)

ii.This effect an audio signal using digital technology. These are the processors that are found in PCs and Digital Audio Recording software today.

1. External processors – Stand alone and are plugged into a sound source.
2. Internal processors are located in the recording software or even mixer.

III. **5 Primary categories of processors (also known as "plug ins")**

1. **Time Domain processors**

i.<u>Reverb and delay</u>

1. Often confused with a delay effect, reverb is a sound *reflection*. In a natural state, when sound echoes down a hallway or in a shower stall, the sound bounces around and is different or

changed each time it echoes until it dies out.
2. A delay on the other hand is a *repeated* reproduction of the same sound at a certain time interval (See more below).

ii.Flanger (IN LOGIC THIS IS IN THE MODULATION MENU OF PLUG INS) – Flanger will create a delay in the signal anywhere from 1-10 milliseconds. The result is a lush type of sound with an extended release.

iii.Chorus (IN LOGIC THIS IS IN THE MODULATION MENU OF PLUG INS)– This delays the signal up to 60 milliseconds thus creating the effect of multiple voices.

iv.Doubling – Here, repetitions are very exact and usually go up to 80 milliseconds. The effect results in a signal that sounds like 2 instruments "doubling" a part.

v.Delay – Repeated signal on an interval of 80 milliseconds or more. The effect is repeated sound of the original signal – unaltered.

1. **Frequency Domain processors**

EQ = Equalizer. These plug ins are used to adjust frequencies within the bandwidth – Highs, Mids, Lows.

i.Analog equalizer – Knobs turn as a dial to adjust frequency ranges (High-Mid-Low). This function is usually found on a Mixing board and is used for live sound engineering as well as analog recording.

ii.Graphic Equalizer – This is a digital equalizer that focuses on a range between 5-31 frequency bands.

iii.High – Low shelf equalizers: These equalizers focus on either the high or low ranges of the signal. They are useful in eliminating certain an over-abundance of high or low frequencies hence eliminating an unwanted boominess or shrill element to your signal.

iv.Parametric Equalizer – This digital equalizer has the ability to select the frequency as well as frequency range hence doing what a graphic equalizer does and much more. This equalizer is the most common EQ tool that is found in digital audio software today.

1. **Dynamic or Amplitude processors**

i.Compressor – When compressing a signal, you are in essence squeezing or compressing the dynamic range. Here, you put a range on how loud a note will be by gauging or compressing the lowest and highest frequencies.

ii.Noise gates- These eliminate or filter out unwanted sounds from a signal such as a crackling sound, feedback or a hmm from a cable that isn't grounded.

iii.Distortion (Distortion, Bit crusher, Overdrive) – These plug ins are used to increase the gain of the signal so as to alter the sound and create a distorted effect.

1. **Sound Placement processors**

i.Imaging – Directional mixer and stereo spread. These plug ins are used to divide the track evenly over the audible space (Left, Right, Front, Back)

1. **Other Processors**

i.Pitch shift and correction – These plug ins are used to alter the pitch in the event that a recorded sound is out of tune. They can also be used to create an altered sound for effect purposes.

ii.Specialized - This group of plug ins include lowering excess noise, boosting low end sounds, adjusting the pulse of a track to match the other tracks etc.

Signal Path

I.**Insert/Send**

1. Insert: When inserting an effect you "insert" the effect to the signal itself hence affecting the signal.
2. Send: When you use a send function for applying an effect, you technically set up the effect on an aux bus port. Here you send the signal to the bus port where the effect is applied. Here you have the ability to EQ both the wet signal (affected) as well as the dry (unaffected signal). As the effect is established in a separate port, you can also apply this effect to other tracks (signals)

- Process Order:
  - EQ each track
  - Insert/Bus FX onto tracks to enhance as needed
  - Adjust Levels for sound balance
  - Pan each track (Sound arrangement Left/Right/Stereo)
- Overall goal in mixing is to achieve the following:
  - Sound Enhancement
  - Sound Clarity
  - Sound Arrangement

Mastering multi track projects down to a stereo master track and editing

- Mastering: Taking a master file that was originally a multi track project and from this creating a file that is broadcast quality in format as well as quality.
  - Process Order:
    - Apply a Master EQ
    - Apply an exciter or multi band compressor
    - Apply a reverb if needed

- Re adjust levels as needed
- Bounce down or “convert” to a format for public use on a music player.
- Universal Formats:
    - MP3
    - WAVE
    - AIFF

Differentiated Instruction

Examples may include:

- Curriculum Map
- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Self-Directed Learning
- Debate
- LMS use
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Rubrics
- Learning Menus
- Learning Through Workstations
- Concept Attainment
- Mentoring
- Student Interest & Inventory Data

Formative Assessments

- Daily Teacher Observation of student feedback.
- Weekly check point written assessments.
- Digital Audio Project - Multi Track vocal Mix project.
- Digital Audio Project - Multi Track Recording Mix project.

Summative Assessment

Digital Audio Project Test - Master 1 Project

Benchmark Assessments

Benchmark - 90% of students in the class will achieve a score of 93 or higher on the summative asessment (Master 1 Project)

Alternate Assessments

- Oral response to questions in review of material.
- More time alloted for written assignments/asessments.
- Take Home projects/reviews/asessments.

Resources & Technology

Digital Audio Workstation - Logic Pro X.

I Mac - Computer system IOS platform

BOE Approved Texts

BOE Approved Texts N/A

Closure

Such as:

- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Question Stems - Have students write questions about the lesson on cards, using question stems framed around Bloom's Taxonomy. Have students exchange cards and answer the question they have acquired.
- Kids answer the following prompts: "What takeaways from the lesson will be important to know three years from now? Why?

- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Ask students to summarize the main idea in under 60 seconds to another student acting as a well-known personality who works in your discipline. After summarizing, students should identify why the famous person might find the idea significant.
- Have students complete the following sentence: "The [concept, skill, word] is like _____ because _____."

ELL

Such as:

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaires

Special Education

List is not inclusive but may include examples such as:

- Shorten assignments to focus on mastery of key concepts.
- Shorten spelling tests to focus on mastering the most functional words.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student’s needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.

- Use a study carrel. (Provide extras so that the student is not singled out.)
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.
- Give progress reports instead of grades.
- Grade spelling separately from content.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for a better grade.
- Average grades out when assignments are reworked, or grade on corrected work.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

At Risk

Examples may include:

- Use of mnemonics
- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Use of a study carrel
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart
- Chart progress and maintain data

Gifted and Talented

Focus on effort and practice

Offer the Most Difficult First

Offer choice

Speak to Student Interests

Allow G/T students to work together

Encourage risk taking