

# Career & Technical Education | Arts & Communication

## Musical Engineering

### Subject Code: 340135

### Outcome & Competency Descriptions

#### Course Description:

Students put music theory and basic music skill into practice as they engineer sound for live and recorded production. They create, capture, edit, mix, and synchronize music into audio and video tracks of various formats. Topics include acoustics, reflection, absorption of sound, and reverberation. Students create products based on research of audience sensitivity and need and do so in compliance with laws related to intellectual property and competition.

#### Strand 1. Business Operations / 21st Century Skills

Learners apply principles of economics, business management, marketing, and employability in an entrepreneur, manager, and employee role to the leadership, planning, developing, and analyzing of business enterprises related to the career field.

#### Outcome: 1.1. Employability Skills

Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

#### Competencies

- 1.1.1. Identify the knowledge, skills, and abilities necessary to succeed in careers.
- 1.1.2. Identify the scope of career opportunities and the requirements for education, training, certification, licensure, and experience.
- 1.1.3. Develop a career plan that reflects career interests, pathways, and secondary and postsecondary options.
- 1.1.4. Describe the role and function of professional organizations, industry associations, and organized labor and use networking techniques to develop and maintain professional relationships.
- 1.1.5. Develop strategies for self-promotion in the hiring process (e.g., filling out job applications, resumé writing, interviewing skills, portfolio development).
- 1.1.7. Apply problem-solving and critical-thinking skills to work-related issues when making decisions and formulating solutions.
- 1.1.8. Identify the correlation between emotions, behavior, and appearance and manage those to establish and maintain professionalism.
- 1.1.9. Give and receive constructive feedback to improve work habits.
- 1.1.10. Adapt personal coping skills to adjust to taxing workplace demands.
- 1.1.11. Recognize different cultural beliefs and practices in the workplace and demonstrate respect for them.
- 1.1.12. Identify healthy lifestyles that reduce the risk of chronic disease, unsafe habits, and abusive behavior.

**Outcome: 1.2. Leadership and Communications**

Process, maintain, evaluate, and disseminate information in a business.  
Develop leadership and team building to promote collaboration.

**Competencies**

- 1.2.1. Extract relevant, valid information from materials and cite sources of information.
- 1.2.4. Use negotiation and conflict-resolution skills to reach solutions.
- 1.2.5. Communicate information (e.g., directions, ideas, vision, workplace expectations) for an intended audience and purpose.
- 1.2.7. Use problem-solving and consensus-building techniques to draw conclusions and determine next steps.
- 1.2.8. Identify the strengths, weaknesses, and characteristics of leadership styles that influence internal and external workplace relationships.
- 1.2.9. Identify advantages and disadvantages involving digital and/or electronic communications (e.g., common content for large audience, control of tone, speed, cost, lack of non-verbal cues, potential for forwarding information, longevity).
- 1.2.10. Use interpersonal skills to provide group leadership, promote collaboration, and work in a team.
- 1.2.11. Write professional correspondence, documents, job applications, and resumé.
- 1.2.12. Use technical writing skills to complete forms and create reports.
- 1.2.13. Identify stakeholders and solicit their opinions.
- 1.2.14. Use motivational strategies to accomplish goals.

**Outcome: 1.3. Business Ethics and Law**

Analyze how professional, ethical, and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance.

**Competencies**

- 1.3.1. Analyze how regulatory compliance affects business operations and organizational performance.
- 1.3.2. Follow protocols and practices necessary to maintain a clean, safe, and healthy work environment.
- 1.3.5. Access and implement safety compliance measures (e.g., quality assurance information, safety data sheets [SDSs], product safety data sheets [PSDSs], United States Environmental Protection Agency [EPA], United States Occupational Safety and Health Administration [OSHA]) that contribute to the continuous improvement of the organization.
- 1.3.7. Identify the labor laws that affect employment and the consequences of noncompliance for both employee and employer (e.g., harassment, labor, employment, employment interview, testing, minor labor laws, Americans with Disabilities Act, Fair Labor Standards Acts, Equal Employment Opportunity Commission [EEOC]).
- 1.3.8. Verify compliance with computer and intellectual property laws and regulations.

- 1.3.9. Identify potential conflicts of interest (e.g., personal gain, project bidding) between personal, organizational, and professional ethical standards.

**Outcome: 1.4. Knowledge Management and Information Technology**

Demonstrate current and emerging strategies and technologies used to collect, analyze, record, and share information in business operations.

**Competencies**

- 1.4.3. Verify compliance with security rules, regulations, and codes (e.g., property, privacy, access, accuracy issues, client, and patient record confidentiality) pertaining to technology specific to the industry pathway.
- 1.4.6. Use an electronic database to access and create business and technical information.
- 1.4.7. Use personal information management and productivity applications to optimize assigned tasks (e.g., lists, calendars, address books).

**Outcome: 1.5. Global Environment**

Evaluate how beliefs, values, attitudes, and behaviors influence organizational strategies and goals.

**Competencies**

- 1.5.1. Describe how cultural understanding, cultural intelligence skills, and continual awareness are interdependent.
- 1.5.2. Describe how cultural intelligence skills influence the overall success and survival of an organization.
- 1.5.3. Use cultural intelligence to interact with individuals from diverse cultural settings.
- 1.5.5. Recognize the ways in which bias and discrimination may influence productivity and profitability.

**Outcome: 1.6. Business Literacy**

Develop foundational skills and knowledge in entrepreneurship, financial literacy, and business operations.

**Competencies**

- 1.6.1. Identify business opportunities.
- 1.6.2. Assess the reality of becoming an entrepreneur, including advantages and disadvantages (e.g., risk versus reward, reasons for success and failure).
- 1.6.12. Describe classifications of employee benefits, rights, deductions, and compensations.

**Outcome: 1.7. Entrepreneurship/Entrepreneurs**

Analyze the environment in which a business operates, and the economic factors and opportunities associated with self-employment.

**Competencies**

- 1.7.7. Create a list of personal strengths, weaknesses, skills, and abilities needed to be successful as an entrepreneur.

- 1.7.9. Conduct a self-assessment to determine entrepreneurial potential.
- 1.7.10. Describe techniques for obtaining experience (e.g., apprenticeship, co-operative [co-op] education, work placement, internship, job shadowing) related to an entrepreneurial objective.
- 1.7.13. Protect intellectual property and knowledge (e.g., copyright, patent, trademark, trade secrets, processes).

**Outcome: 1.8.      Operations Management**

Plan, organize, and monitor an organization or department to maximize contribution to organizational goals and objectives.

**Competencies**

- 1.8.1. Forecast future resources and budgetary needs using financial documents (e.g., balance sheet demand forecasting, financial ratios).
- 1.8.2. Select and organize resources to develop a product or a service.
- 1.8.4. Identify alternative actions to take when goals are not met (e.g., changing goals, changing strategies, efficiencies).
- 1.8.5. Use inventory and control systems to purchase materials, supplies, and equipment (e.g., Last In, First Out [LIFO]; First In, First Out [FIFO]; Just in Time [JIT]; LEAN).
- 1.8.8. Identify routine activities for maintaining business facilities and equipment.

**Outcome: 1.9.      Financial Management**

Use financial tools, strategies, and systems to develop, monitor and control the use of financial resources to ensure personal and business financial well-being.

**Competencies**

- 1.9.1. Create, analyze, and interpret financial documents (e.g., budgets, income statements).
- 1.9.8. Identify income sources and expenditures.
- 1.9.10. Identify the role of depreciation in tax planning and liability.

**Outcome: 1.10.      Sales and Marketing**

Manage pricing, place, promotion, packaging, positioning, and public relations to improve quality customer service.

**Competencies**

- 1.10.2. Determine the customer's needs and identify solutions.
- 1.10.5. Monitor customer expectations and determine product/services satisfaction by using measurement tools.

### **Strand 3.                      Written Content Creation**

Learners apply content creation knowledge and skills to use the intended message for entertainment, journalism, or marketing purposes.

**Outcome: 3.5.              Social Media**  
Develop content for social media.

#### **Competencies**

3.5.5.    Create content tailored to a specific social media platform.

## **Strand 4. Audio, Video, and Photo Imaging**

Learners apply knowledge and skills of photography and videography to capture, engineer, and manipulate audio, images, and video for media production.

### **Outcome: 4.1. Science of Sound**

Apply the characteristics and properties of sound to a professional production.

#### **Competencies**

- 4.1.1. Identify the properties of sound.
- 4.1.2. Classify elements in sound transduction, including resistance, balanced versus unbalanced lines, and how sound energy is converted into electrical energy.
- 4.1.3. Measure sound in a variety of ways, such as perceived loudness (human judgement) peak level, RMS root mean squared or LUFS.
- 4.1.4. Identify sound pressure level (SPL).
- 4.1.5. Analyze room acoustics and their impact on sound, such as diffraction, diffusion, phase, and harmonics.
- 4.1.6. Apply the principles of direct sound, early reflection, and reverberation.
- 4.1.7. Apply the principles of digital audio theory (e.g., sampling rate, bit depth, Nyquist Theorem, and various compression algorithms for lossy and lossless audio).

### **Outcome: 4.2. Audio Capturing**

Apply the principles and properties of how sound is measured, converted and perceived to capture an audio recording for professional purposes.

#### **Competencies**

- 4.2.1. Compare and contrast microphone properties (e.g., polar patterns, type of transducer) with their intended use (e.g., handheld, lav, boom).
- 4.2.2. Determine microphone and monitor placement according to directional characteristics.
- 4.2.3. Organize a production from pre-production through publishing and distribution.
- 4.2.4. Distinguish among digital media formats (e.g., .mp3, .mp4, .wav, .aiff).
- 4.2.5. Select a score for production and post-production needs.

### **Outcome: 4.3. Audio Operations**

Manipulate recordings for professional purposes.

#### **Competencies**

- 4.3.1. Produce recordings in a variety of settings (e.g., studio, live, post-production).
- 4.3.2. Apply digital signal processing (DSP) (e.g., EQ, compression, reverb, delay, etc.).
- 4.3.3. Synchronize media from different sources.
- 4.3.4. Mix audio, including relative level, spatial positioning, equalization, dynamics processing, and effects processing.
- 4.3.5. Design and set a stage plot for live performance.
- 4.3.6. Mix live sound for a variety of events (e.g., concert, speech, panel discussion, performance, etc.).

### **Outcome: 4.7. Audio/Video Editing**

Edit post-production audio or video for commercial purposes.

#### **Competencies**

- 4.7.1. Compare and contrast linear and nonlinear digital editing systems for audio/video.
- 4.7.2. Import and log media for editing.
- 4.7.3. Manage files of digital clips.
- 4.7.4. Use storyboard techniques to place media on a timeline.
- 4.7.6. Edit audio or video online and offline with transitions, cutting points, order of shots, and continuity.
- 4.7.8. Mix audio for video through filters, ambient sound, sound effects, equalization (EQ), and matching levels.
- 4.7.10. Export and upload media for desired specifications and for appropriate platforms.

## **Strand 6.**

### **Digital Design**

Learners apply knowledge and skills of digital design to manipulate and animate new and existing audio, video, or photo images to create graphics for internet, broadcast, mobile, and other multimedia applications.

## **Outcome: 6.1.**

### **Content Management**

Import, store, export, and manage digital assets.

### **Competencies**

- 6.1.7. Export media in the appropriate format for delivery.
- 6.1.8. Manage and archive digital assets through organizational techniques (e.g., metadata, keywords, file/folder structure, name conventions).



## **Strand 7. Performance**

Learners apply knowledge and skills for performance, including roles, processes, procedures, and production design.

### **Outcome: 7.2. Genres**

Analyze and critique the stylistic differences among genres.

#### **Competencies**

- 7.2.1. Describe, compare, and contrast various styles and traditions.
- 7.2.2. Identify and compare the lives, works, and influence of significant individuals in various cultures, traditions, and historical periods.
- 7.2.3. Compare and contrast characteristics (e.g., technique, form, content) of genres from a particular time period or area of influence.
- 7.2.4. Explain the influence of social context, historical periods, and culture in the development of a performance.
- 7.2.5. Identify styles and epochs in the history of music including chamber, baroque, classical, romantic, jazz, contemporary, instrumental, and vocal.

### **Outcome: 7.6. Music Elements**

Distinguish the elements of music through listening.

#### **Competencies**

- 7.6.1. Identify pitch, interval, scales, solfege, and chords.
- 7.6.2. Identify meter.
- 7.6.3. Identify voice leading and harmonic progressions.
- 7.6.4. Identify the relationship between melodies and harmony.
- 7.6.5. Identify the key and tonality of a work.
- 7.6.6. Identify the rhythmic pattern of a piece of music.

- 7.6.7. Identify the instrumentation and form of a work.
- 7.6.8. Identify different instrumental and vocal timbres.
- 7.6.9. Compare and contrast rhythm, patterns, and style in a performance.
- 7.6.10. Analyze examples of a varied repertoire of music, representing diverse styles and cultures.

**Outcome: 7.9. Musical Composition**

Arrange, compose, and score music using notation and sequencing software.

**Competencies**

- 7.9.1. Analyze the form, melody, harmony, and rhythm of a composition.