

Downey Unified School District – Career Technical Education

AUDIOVISUAL TECHNOLOGY ESSENTIALS [G] ~ CERT

INDUSTRY SECTOR: Information and Communication Technologies Sector

PATHWAY: Information Support and Services

CALPADS TITLE: Intermediate Information Support Services (Concentrator)

CALPADS CODE: 8111

HOURS:

Total	Classroom	Laboratory/CC/CVE
180	60	120

JOB TITLE	O*NET CODE	JOB TITLE	O*NET CODE
Electronic Home Entertainment Equipment Installers and Repairers	49-2097.00	Audio and Video Equipment Technicians	27-4011.00
Media and Communication Workers, All Other	27-3099.00	Sound Engineering Technicians	27-4014.00

COURSE DESCRIPTION:

Audiovisual (AV) Technology Essentials is an introductory overview of the science and technology for audio, visual, and audiovisual systems integration. Students explore microphones, cameras and displays, digital signage, signals, networking/IT, future AV trends and related electronic equipment for online broadcast, concerts, sports, events, meetings and conventions, presentations, and more.

A-G APPROVAL: G

ARTICULATION: None

DUAL ENROLLMENT: None

PREREQUISITES:

Prerequisite
None

METHODS OF INSTRUCTION

- Direct instruction
- Group and individual applied projects
- Multimedia
- Demonstration
- Field trips
- Guest speakers

STUDENT EVALUATION:

- Student projects
- Written work
- Exams
- Observation record of student performance
- Completion of assignment

INDUSTRY CERTIFICATION:

- AVIXA AV Technologist Certificate

RECOMMENDED TEXTS:

- TBD - Books will change annually based on industry input
- Audiovisual Best Practices : The Design and Integration Process for the AV and Construction Industries

PROGRAM OF STUDY

Grade	Fall	Spring	Year	Course Type	Course Name
9, 10, 11				Concentrator	Audiovisual Technology Essentials [G] ~ CERT
10, 11, 12				Capstone	Audiovideo Technology, Advanced

I.	ESSENTIALS OF AV EXPERIENCES	CR	Lab/ CC	Standards
	<p>In this course students will find out what AV is about, why it is important, career opportunities, and the variety of ways in which AV is used in many different industries.</p> <p>This unit will give students a glimpse of how AV can be used in conjunction with content and space to create exceptional experiences for all audience types.</p> <p>Students will research AV industry careers and how the skills used in AV align with multiple pathways and industries. They will identify and define the principles of AV technology and provide at least two examples of careers they are interested in pursuing in the industry and explain their interest.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Exceptional Experiences • AV Experience End Goals • AV Experience Participation • AV Experience Characterization • Three Components of an AV Experience • Experience Levels • Exceptional Experiences Creating Engagement <p>Students will be able to:</p> <ul style="list-style-type: none"> • Give characteristics of an exceptional AV experience • Describe the four characterizations of an AV experience (collaboration, exploration, instruction, sensation) • Describe the three components of an AV experience and give examples of each • Describe what engagement looks like with each AV experience characterization <p>In conclusion, students will explore the exciting world of Audiovisual (AV) technology and its importance in creating exceptional experiences for various audiences. They will learn about the different AV industry careers and how the skills used in AV align with multiple pathways and industries. Through research and discussion, students will identify and define the principles of AV technology, and explain their interest in pursuing a specific career within the industry. By the end of the unit, students will be able to give characteristics of an exceptional AV experience, describe the four characterizations of an AV experience, and describe engagement with each AV experience characterization</p>	10	5	<p>Academic: LS: 11-12.1, 11-12.2, 11-12.3, 11-12.6 RSIT: 11-12.7 WS: 11-12.7, 11-12.8 PE: 12.8, 12.8.2, 12.8.3 US: 11.8 WH: 10.11</p> <p>CTE Anchor: Communications: 2.1, 2.6, 2.7, 2.8 Career Planning and Management: 3.2, 3.3, 3.6, 3.7 Technology: 4.1, 4.3, 4.5 Problem Solving and Critical Thinking: 5.1 Responsibility and Flexibility: 7.1, 7.5 Leadership and Teamwork: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7 Technical Knowledge and Skills: 10.14 Demonstration and Application: 11.1</p> <p>CTE Pathway: A1.1, A1.2, A2.1, A6.1, A7.3</p>
II.	AUDIO SYSTEMS	CR	Lab/ CC	Standards
	<p>Students will learn the basics of sound propagation, sound wave characteristics, harmonics, the decibel, and the sound environment. Students will explore how these basics apply to the electrical pathway used to amplify sound and will trace the audio-signal chain from start to finish-microphones to loudspeakers. Signal levels, cables used, and types of circuits will all be discussed so that students are able to begin making informed audio decisions.</p> <p>Each student will create an audio system design for a typical classroom and live performance event. Using industry standard design software, the student will work from a pre-defined set of project requirements to deliver an audio system solution. The students will then take those designs and implement it in the stage/classroom lab. The audio system design along with photos/videos from the installation will be part of their final portfolio.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Sound Waves • Octaves and Bands 	10	20	<p>Academic: LS: 11-12.5 RSIT: 11-12.1, 11-12.3 WS: 11-12.4</p> <p>CTE Anchor: Communications: 2.5 Technology: 4.1, 4.2, 4.3 Problem Solving and Critical Thinking: 5.3, 5.4, 5.5 Health and Safety: 6.3, 6.4, 6.6, 6.7, 6.8, 6.9, 6.11</p>

	<ul style="list-style-type: none"> • Harmonics and Complex Waveforms • Logarithms • Decibels • Inverse Square Law and Sound <p>Students will be able to</p> <ul style="list-style-type: none"> • Separate a sine wave to define its frequency, wavelength, and amplitude • Explain how components of a sine wave are related • Describe how sound is altered by changes in amplitude, frequency, or wavelength • Explain how different harmonics are determined and fit together to create a complex waveform • Recognize logarithmic vs. linear scales • Explain a scenario where it would be beneficial to use logarithms • Recall that decibels are comparisons, not absolute quantities • Name three units that can be used to measure decibels • Use the inverse square law to predict how distance affects sound pressure <p>In conclusion, this unit provides students with an introduction to the fundamentals of sound and audio technology. Through hands-on projects, students will apply their understanding of sound waves, harmonics, the decibel, and sound environment to create an audio system design for a typical classroom and live performance event. The unit covers important concepts such as sound waves, octaves and bands, complex waveforms, logarithms, and decibels, as well as the inverse square law and its impact on sound. The audio system design and installation will provide students with a tangible demonstration of their newfound knowledge and skills, which they can include in their final portfolio.</p>			<p>Ethics and Legal Responsibilities: 8.1, 8.2</p> <p>Technical Knowledge and Skills: 10.2, 10.3</p> <p>Demonstration and Application: 11.1</p> <p>CTE Pathway: A2.3, A8.1, A8.2</p>
III.	VISUAL SYSTEMS	CR	Lab/CC	Standards
	<p>In this unit, students will learn the basics of light by exploring its properties and behaviors as a wave. Video signals and aspect that affect their quality will be discussed, along with visual systems standards, old and new. Multiple methods of displaying images will be explored to give students the basic ability to determine the system that will produce that highest quality image for viewers.</p> <p>Each student will create a lighting design for an indoor live performance event. Using industry standard lighting design software, the student will work from a pre-defined set of project requirements to deliver a lighting solution. The students will then take those designs and implement it in the lighting lab. The lighting design and photos/videos from the installation will be part of their final portfolio.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Vision and Light • Wavelength, Frequency, & Amplitude of Light • Measuring Light • Behavior of Light • Inverse Square Law and Light • Color • Light and AV Applications <p>Students will be able to:</p> <ul style="list-style-type: none"> • Predict how changes in amplitude, frequency, and wavelength will affect the characteristics of light • Explain two types of light that can be measured along with their respective measuring devices • Contrast the light behavior of refraction, dispersion, reflection, scattering, and absorption • Calculate how distance affects light's brightness and surface area • Name and define the three characteristics used to describe color- value, 	10	20	<p>Academic: LS: 11-12.4 RSIT: 11-12.3 A-REI: 1</p> <p>CTE Anchor: Communications: 2.6 Technology: 4.1, 4.2, 4.3, 4.5, 4.6 Problem Solving and Critical Thinking: 5.1, 5.3, 5.4, 5.7, 5.8, 5.9 Health and Safety: 6.2, 6.3, 6.6, 6.7, 6.8, 6.9 Responsibility and Flexibility: 7.5, 7.7 Ethics and Legal Responsibilities: 8.7 Technical Knowledge and Skills: 10.1, 10.4, 10.5, 10.6, 10.11, 10.12, 10.13 Demonstration and Application: 11.1</p> <p>CTE Pathway: A2.3, A3.1, A5.1,</p>

	<p>hue, and saturation</p> <ul style="list-style-type: none"> • Explain the difference between an ellipsoidal reflector spotlight and a PARcan • Name the four different lights used in videoconferencing lighting • Give examples of ambient light and state possible solutions <p>In conclusion, this unit provides an introduction to the basics of light and its properties, as well as its behavior as a wave. Students will learn about video signals and their quality, as well as various methods of displaying images, to determine the best system for producing the highest quality image for viewers. The students will put their newfound knowledge into practice by creating a lighting design for an indoor live performance event, using industry standard lighting design software. They will then implement their designs in the lighting lab, resulting in a portfolio of their lighting design and photos/videos from the installation. By the end of this unit, students will be able to predict the effects of changes in light's amplitude, frequency, and wavelength, contrast the behavior of light, and understand the three characteristics used to describe color, among other skills.</p>			A6.1, A6.2, A6.4, A6.7, A8.1
IV.	NETWORKING FOR DATA AND AV	CR	Lab/CC	Standards
	<p>In this unit, students will gain an overview of networking concepts that pertain to the control of AV systems. The OSI Model will be discussed with AV relevant examples at each layer. Students will learn the basics of networking, complete with components, addressing, and security all seen through an AV lens.</p> <p>Each student will work from a pre-defined set of project requirements to deliver a data solution for LED screens in the lab environment. This will include creating and running cables and connections, setting up lighting, screens, audio, and more in a network. The network design and photos/videos from the installation will be part of their final portfolio.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Types of Networks • Network Topologies • Ethernet • Ethernet Cabling and Connections • Wireless Connections <p>Students will be able to:</p> <ul style="list-style-type: none"> • Classify networks based on their scale • Distinguish between various network topologies • Define Ethernet and describe its benefits • Decide which category cable should be used in different scenarios based on the required speed of data transfer • Describe advantages and disadvantages of fiber-optic cabling • Decide which connector type is used with category and fiber-optic cabling • Describe benefits and drawbacks of wireless connections <p>In conclusion, this unit aims to provide students with an understanding of AV relevant networking concepts. The students will learn about the different types of networks, network topologies, Ethernet cabling and connections, and wireless connections. By the end of the unit, students will be able to classify networks based on their scale, differentiate between network topologies, understand Ethernet and its benefits, and make informed decisions regarding cabling and connections. Through the hands-on project of creating a data solution for LED screens, students will apply what they have learned and have the opportunity to demonstrate their mastery of the material. This project and its resulting network design will be a part of their final portfolio, showcasing their competency in networking for AV systems.</p>	5	15	<p>Academic: LS: 11-12.2, 11-12.3, 11-12.6 RSIT: 11-12.3 WS: 11-12.4, 11-12.8 A-REI: 1, 2</p> <p>CTE Anchor: Communications: 2.6, 2.7, 2.8 Technology: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 Problem Solving and Critical Thinking: 5.1, 5.3, 5.4, 5.5, 5.6, 5.7 Health and Safety: 6.4, 6.7, 6.11 Responsibility and Flexibility: 7.5 Ethics and Legal Responsibilities: 8.1, 8.2, 8.3, 8.4, 8.7 Leadership and Teamwork: 9.1, 9.6, 9.7 Technical Knowledge and Skills: 10.1, 10.1, 10.4, 10.5, 10.9 Demonstration and Application: 11.1</p> <p>CTE Pathway: A1.1, A2.1, A2.2, A2.3, A2.4, A3.1, A3.2, A3.5, A3.6, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A7.1, A7.3,</p>

				A7.5, A8.1, A8.2
V.	ANALOG AND DIGITAL SIGNALS	CR	Lab/ CC	Standards
	<p>In this unit, students will learn the difference between analog and digital signals. Students will learn the benefits of each type by dissecting at the anatomy of a wave, delving into bit depth and sampling rate, and experiencing the transmission of these signals.</p> <p>Each student will work from a pre-defined set of project requirements to deliver an integrated audio and video installation for non-entertainment use. This could include government, education, or corporate installation. This will include creating and running cables and connections, setting up cameras, screens, audio, and more in a network. The network design and photos/videos from the installation will be part of their final portfolio.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Analog and Digital Signals Introduction • Sampling Rate and Bit Depth • Understanding Sampling Rate • Understanding Bit Depth • Bit Rate • Digital Formats • Lossless and Lossy Compression • Noise and Signal Transmission <p>Students will be able to</p> <ul style="list-style-type: none"> • Distinguish between an analog and digital signal based on its waveform • Categorize systems as analog or digital • Explain how sampling rate affects the quality of a digital representation of an analog signal • Explain the benefits and drawbacks of utilizing large bit depths • Compare file formats based on their bit rate • Cite the benefits and drawbacks of lossless and lossy compression • Illustrate how noise affects both analog and digital signal transmission <p>In conclusion, students will delve into the world of analog and digital signals, exploring the anatomy of a wave, sampling rate, bit depth, and transmission of these signals. Through hands-on projects, students will design and implement integrated audio and video installations for non-entertainment use, such as government, education, or corporate settings. By the end of the unit, students will have an understanding of the differences between analog and digital signals, and will be able to distinguish between the two, categorize systems as analog or digital, and compare file formats based on their bit rate.</p>	10	20	<p>Academic: LS: 11-12.6 RSIT: 11-12.7 WS: 11-12.6 A-CED: 4 A-REI: 1</p> <p>CTE Anchor: Communications: 2.6 Technology: 4.1, 4.3, 4.4, 4.6 Problem Solving and Critical Thinking: 5.1, 5.4, 5.5, 5.9, 5.10 Health and Safety: 6.2, 6.3, 6.4, 6.6 Responsibility and Flexibility: 7.5 Technical Knowledge and Skills: 10.1, 10.7</p> <p>CTE Pathway: A2.1, A2.2, A2.3, A2.4, A3.1, A3.3, A3.5, A4.1, A4.3, A6.4, A6.7, A7.1, A8.1</p>
VI.	SOUND AND AUDIO	CR	Lab/ CC	Standards
	<p>In this unit, students will explore behind-the-scenes elements of the AV industry. Physical components of AV systems, such as cabling and connectors, as well as intangible components, such as radio waves and control signals, will be studied. Students will also gain a high-level understanding of electricity flow through an AV circuit and will be introduced to equations that can be used to predict and describe current, resistance, and voltage in a circuit.</p> <p>Students will create a public address announcement to be used on the campus or at school athletic event. Using open-source sound editing software this project will take the students through the steps necessary to create content for the AV systems they have been building and servicing. Students will also learn about the different file formats, bit rate, and system requirements for this type of content. Students will use this project as part of their AV portfolio at the end of the course.</p> <p>Topics Covered:</p>	10	20	<p>Academic: LS: 11-12.5 RSIT: 11-12.3, 11-12.5 WS: 11-12.7, 11-12.8</p> <p>CTE Anchor: Communications: 2.1 Technology: 4.1, 4.2, 4.4, 4.5, 4.6 Problem Solving and Critical Thinking: 5.7, 5.9, 5.10</p>

	<ul style="list-style-type: none"> • Control System Functions • Control Systems on Networks • Interfaces • Control Signals <p>Students will be able to:</p> <ul style="list-style-type: none"> • Give three examples of control system functions. • Explain how a macro differs from a control system function. • Name at least two new possibilities that exist with control systems on networks • Name two common types of interfaces • Define uni- and bi-directional communication between devices and the CPU • Describe contact closure and variable voltage control and common uses for each • Explain why USB was created and name two benefits of this technology • Compare, and contrast wireless infrared with radio frequency control • Name a pro and con of radio frequency control <p>In conclusion, the student will be exploring the behind-the-scenes elements of the AV industry and its systems. From studying the physical and intangible components, students will gain a better understanding of electricity flow, control systems, and interfaces. The practical project of creating a public address announcement will bring together the knowledge learned in the course and allow students to apply it to a real-world situation and include it in their portfolio. The unit covers a variety of topics, including control system functions, networks, and signals, with the aim of providing students with hands-on experience and a comprehensive understanding of the AV industry.</p>			<p>Health and Safety: 6.2, 6.4, 6.8, 6.11</p> <p>Ethics and Legal Responsibilities: 8.1</p> <p>Leadership and Teamwork: 9.6</p> <p>Technical Knowledge and Skills: 10.1, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.8, 10.9, 10.11, 10.12, 10.13, 10.14</p> <p>Demonstration and Application: 11.1</p> <p>CTE Pathway: A2.1, A2.2, A2.3, A2.4, A3.1, A3.3, A4.1, A5.1, A6.1, A6.6, A7.1, A7.3</p>
VII.	EMPLOYMENT & CAREER PORTFOLIO	CR	Lab/CC	Standards
	<p>This unit is designed to provide students with the knowledge and skills necessary to successfully enter the audiovisual industry. The focus will be on creating a professional portfolio, understanding the job market, and learning the skills and qualifications needed for different audiovisual positions. This unit will also cover the steps to finding and applying for jobs in the industry, as well as interviewing and networking strategies.</p> <p>Each student will create a professional portfolio that includes their resume, cover letter, and a selection of their best work. The portfolio should showcase their skills and qualifications in the audiovisual field, and should be tailored to the type of position they are applying for. The student will also research and analyze the job market in the audiovisual industry, identifying the most in-demand positions and the qualifications required for those jobs.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Creating a professional portfolio • Resume and cover letter writing • Job market research and analysis • Interview and networking strategies • Skills and qualifications needed for different audiovisual positions <p>The student will be able to:</p> <ul style="list-style-type: none"> • Create a professional portfolio that showcases their skills and qualifications in the audiovisual field • Understand the job market in the audiovisual industry and identify in-demand positions • Write a resume and cover letter tailored to the type of audiovisual position they are applying for • Successfully find and apply for jobs in the audiovisual industry • Interview and network effectively to secure a position in the industry <p>In conclusion, this unit will provide students with the tools and knowledge they need to enter the audiovisual industry. By creating a professional portfolio,</p>	3	17	<p>Academic: LS: 11-12.6 WS: 11-12.4</p> <p>CTE Anchor: Communications: 2.1, 2.5, 2.6, 2.7 Career Planning and Management: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9 Technology: 4.2, 4.5 Problem Solving and Critical Thinking: 5.4 Health and Safety: 6.2 Responsibility and Flexibility: 7.2, 7.3, 7.4, 7.7 Ethics and Legal Responsibilities: 8.1, 8.2, 8.4, 8.5, 8.6, 8.7 Leadership and Teamwork: 9.2, 9.4, 9.5, 9.7 Technical Knowledge and Skills: 10.1, 10.14</p>

	understanding the job market, and learning the skills and qualifications needed for different positions, students will be well-prepared to find and secure a job in the industry. Additionally, the unit will teach them how to interview and network effectively, which are essential skills for success in any field.			Demonstration and Application: 11.1, 11.3, 11.5 CTE Pathway: A1.1, A8.1
VIII.	CERTIFICATION	CR	Lab/CC	Standards
	<p>In this unit, students will learn about industry certifications available in the audiovisual industry, including the process of obtaining certifications, the benefits of holding certifications, and the various types of certifications available. The unit will cover the requirements for certification, the testing process, and the importance of continuing education to maintain certifications.</p> <p>Students will research and select an industry certification that aligns with their career goals. They will then create a plan to obtain the certification, including a schedule of study, a list of resources, and a timeline for testing. Students will also create a continuing education plan to maintain their certification.</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Industry certifications available in the audiovisual industry • The process of obtaining certifications • The benefits of holding certifications • Various types of certifications available • Requirements for certification • The testing process • Importance of continuing education to maintain certifications <p>After completing the unit, students will be able to:</p> <ul style="list-style-type: none"> • Understand the various industry certifications available in the audiovisual industry • Create a plan to obtain an industry certification • Understand the requirements for certification • Understand the importance of continuing education to maintain certifications <p>Each student enrolled in the pathway will have the opportunity to take the following certification(s) during this course:</p> <ul style="list-style-type: none"> • AVIXA Recognized AV Technologist Certificate AVIXA-Recognized AV Technologist Test has been developed to not only provide a common AV vocabulary, but also provide a bridge to the ANAB-accredited Certified Technology Specialist™ (CTS®) credentials. • https://www.avixa.org/training-section/technologist-certificate <p>In conclusion, students will learn about the various industry certifications available in the audiovisual industry and the importance of obtaining and maintaining certifications in the field. They will have the opportunity to research and plan for obtaining a certification that aligns with their career goals, and learn about the requirements, testing process, and the importance of continuing education to maintain certifications.</p>	2	3	<p>Academic: LS: 11-12.1</p> <p>CTE Anchor: Demonstration and Application: 11.2</p> <p>CTE Pathway: A3.5, A3.1, A3.3, A6.6, A7.1</p>

Entered by:

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