



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Content Area: Theatre

Unit Title: Lighting Design

Target Course/Grade Level: Grades 9-12

Unit Summary: Stage lighting is an actionable, technical, and artistic tool for storytelling. In this unit students will be able to identify and describe possible career paths with a background in lighting design and technology as well as begin to develop an understanding of and manipulate the four controllable qualities of light: angle, color, distribution, and movement.

Approximate Length of Unit: Modify projects as needed

[New Jersey Student Learning Standards:](#)

H.S. Proficient:

- 1.4.12prof.Cr1
 - a. Research to construct ideas about the visual composition of devised or scripted theatre work.
 - b. Explore the impact of technology on design choices in devised or scripted theatre work.
- 1.4.12prof.Cr3 c. Explore technical design choices that support the story and emotional impact of a scripted or devised theatre work.
- 1.4.12prof.Cr2
 - b. Examine the collaborative nature of the actor, director, playwright, and designers, and explore their interdependent roles.
 - c. Explore technical design choices that support the story and emotional impact of a scripted or devised theatre work.
- 1.4.12.prof.Pr4 b. Use technical elements to increase the impact of design for a theatre production.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- 1.4.12.prof.Re8 b. Evaluate the aesthetics of the production elements in a devised or scripted theatre work and their ability to support or extend the storyline.

New Jersey Student Learning Standards (continued):

H.S. Accomplished:

- 1.4.12acc.Cr1 b. Understand and apply technology to design choices for devised or scripted theatre work.
- 1.4.12acc.Cr2 b. Cooperate as a creative team to make informative and analytical choices for devised or scripted theatre work.
- 1.4.12acc.Cr3 c. Re-imagine technical design choices during the course of the rehearsal process to enhance the story and emotional impact of a devised or scripted theatre work.
- 1.4.12acc.Pr4 b. Apply theatrical elements and research to create a design that communicates the concept of a theatre production.
- 1.4.12acc.Re8 b. Construct meaning in a devised or scripted theatre work, considering personal aesthetics and knowledge of production elements while respecting others' interpretations.

H.S. Advanced:

- 1.4.12adv.Cr1 a. Synthesize knowledge from a variety of theatrical conventions and technologies to create the visual composition of devised or scripted theatre work.
- 1.4.12adv.Cr1 b. Create a complete design for devised or scripted theatre work that incorporates multiple elements of technology.
- 1.4.12adv.Cr2 a. Collaborate as a creative team to make informative and analytical choices for devised or scripted theatre work.
- 1.4.12adv.Cr2 b. Collaborate as a creative team to make original artistic choices in devised or scripted theatre work.
- 1.4.12adv.Cr3 c. Originate and construct technical design choices that support the story and emotional impact of a devised or scripted theatre work.



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- 1.4.12adv.Pr4 b. Create and justify the selection of technical elements used to develop and build a design that communicates the concept of a drama/theatre production.
- 1.4.12adv.Re8 b. Analyze and evaluate varied aesthetic interpretations of production elements for the same devised or scripted theatre work.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

New York State Theatre Student Learning Standards:

HS Proficient

- TH:Cr1.1.HSI
 - a. Apply basic research to construct ideas about the visual composition of a drama or theater work.
 - b. Explore the effect of technology on design choices.
- TH:Cr2.1.HSI
 - b. Investigate the collaborative nature of the actor, director, playwright, and designers and explain how their roles can be interdependent.
- TH:Cr3.1.HSI
 - c. Refine technical design choices to support the story of a devised or scripted drama or theater work.
- TH:Pr5.1.HSI
 - b. Use research to enhance a technical design.
- TH:Re7.1.HSI
 - a. Respond to what is seen, felt, and heard in a drama or theater work to develop criteria for artistic choices.
- TH:Re9.1.HSII
 - b. Critique the aesthetics of technical elements in a drama or theater work.

HS Accomplished

- TH:Cr1.1.HSII
 - a. Investigate historical and cultural conventions and their effect on the visual composition of a drama or theater work.
 - b. Understand and apply technology to design solutions for a drama or theater work.
- TH:Cr2.1.HSII
 - b. Cooperate as a creative team to make interpretive choices.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

New York State Theatre Student Learning Standards (continued):

- TH:Cr3.1.HSII
 - a. Analyze the dramatic concept and technical design elements of a devised or scripted drama or theater work.
 - c. Revise technical design choices during a rehearsal process to enhance the story and emotional impact of a devised or scripted work.
- TH:Pr5.1.HSII
 - b. Apply research of technical elements to create a design that communicates a theatrical concept.
- TH:Re7.1.HSII
 - a. Explain how multiple interpretations of a drama or theater work can influence future artistic choices.
- TH:Re9.1.HSII
 - b. Draw on personal aesthetics and technical elements to construct meaning in a drama or theater work.

HS Advanced

- TH:Cr1.1.HSIII
 - a. Synthesize knowledge from a variety of dramatic forms, theatrical conventions, and technologies to create the visual composition of a drama or theater work.
 - b. Create a complete design for a drama or theater work that incorporates technical elements.
- TH:Cr2.1.HSIII
 - b. Collaborate as a creative team to discover artistic solutions and make interpreted choices in a devised or scripted drama or theater work.
- TH:Cr3.1.HSIII
 - c. Apply technical proficiency to support the story and emotional effect of a devised or scripted drama or theater work.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

[New York State Theatre Student Learning Standards \(continued\):](#)

- TH:Pr5.1.HSIII
 - b. Explain and justify the technical design used to communicate a theatrical concept.
- TH:Re7.1.HSIII
 - a. Use historical and cultural context to structure and justify personal responses to a drama or theater work.
- TH:Re9.1.HSIII
 - b. Analyze and evaluate the aesthetic interpretation of multiple renditions of a drama or theater work.



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Unit Understandings:

Students will understand that...

Project 1: Exploring Angles of Light with “Found” Lights

- The lighting designer serves as a technical and artistic role in the performing arts industry that includes work in theatre, opera, dance, concert settings, as well as industrial applications; however, more career paths are possible.
- The lighting designer's main objective is to tell a story through the shaping and manipulation of the four controllable qualities of light (angle, color, distribution, and movement) on a modern computerized lighting control console.
- Training as a lighting designer can lead to a prolific career not only in the legitimate theatre, but also in film, television, industrial design, etc.
- A modern computerized lighting control console is used as a way to manipulate the four controllable qualities of light.

Project 2: Creating Stage Pictures

- Art-related vocabulary is an effective way to describe a lighting composition.
- There are different qualities of light in artistic research.
- Designing a practical lighting composition is based on a student’s understanding of the qualities of light based on a given 2-dimensional work of art using a small-scale lighting rig as might be found in the participant’s own school.
- Designing a practical lighting composition uses two systems of complementary color and angle in order to create selected visibility, mood, time of day, and/or location.

Project 3: Tips and Tricks for working in a High School Level Lighting Plot

- A “shopping list” and a “cuelist” are created by identifying key elements from a script or “story” necessary for lighting a play, musical or dance piece.
- A lighting designer creates and uses a “magic sheet” based on an existing or planned light plot.
- Common lighting fixtures will be a resource for lighting designers as they are in most secondary schools’ inventory.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- A lighting designer must be able to create an accurate “equipment list” through knowledge of common lighting fixtures.
- Lighting designers must use mathematics to ensure accurate calculations regarding the size of a stage light from a given measurable position in a theater.
- A group of lights can form an effective, even “system” of lights from measurable locations in a theater through mathematical calculations. [sectioning a light]
- Basic paperwork types are used to effectively plan, manage and maintain a stage lighting design.
- A “rental shop order” must be built and must also be effectively communicated with a local lighting rental shop.
- A lighting design must be tracked through a show using annotated cue lists, and scripts.

Project 4: Hands-on Session

- A lighting designer uses the basic architecture of a modern ETC based computerized lighting control console to patch, work in live and blind modes, write timed cues, and save and load files.

Unit Essential Questions:

Project 1: Exploring Angles of Light with “Found” Lights

- What is the role of a lighting designer?
- How can lighting be used as a technical and artistic tool for storytelling?
- What transferable skills and/or careers are available to me as a lighting designer?
- How does a modern computerized lighting control console function as a technical tool for lighting design?
- What are the qualities of light?

Project 2: Creating Stage Pictures

- Why should art-related vocabulary be used to describe elements of lighting compositions?
- How does a lighting designer engage in artistic research with different qualities of light?
- How does a lighting designer assess the qualities of light based on a given 2-dimensional work of art using a small-scale lighting rig?



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- Why must a lighting designer use two systems of complementary color and angle in order to create selected visibility, mood, time of day, and/or location?

Project 3: Tips and Tricks for working in a High School Level Lighting Plot

- How does a lighting designer create a “shopping list” and “cue list” for lighting a play, musical or dance piece?
- How does a lighting designer create a “magic sheet” based on an existing or planned light plot?
- What are some common lighting fixtures that a lighting designer might encounter in most secondary schools’ inventory?
- How does a lighting designer assemble an accurate “equipment list”?
- How does a lighting designer calculate the size of a stage light from a given measurable position in a theater?
- What calculations must be done in order for a group of lights to form an effective, even “system” of lights from measurable locations in a theater?
- What are the basic paperwork types used to effectively plan, manage and maintain a stage lighting design?
- What is a “rental shop order” and how does a lighting designer effectively communicate and interact with a local lighting rental shop?
- How does a lighting designer track a lighting design through a show using annotated cue lists, and scripts?

Project 4: Hands-on Session

- How does a lighting designer use the basic architecture of a modern ETC based computerized lighting control console to patch, work in live and blind modes, write timed cues, and save and load files?

Knowledge and Skills:

At the end of this unit, Students will know...

Project 1: Exploring Angles of Light with “Found” Lights

- The role of the lighting designer.
- That light is a technical and artistic tool for storytelling.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- The four controllable qualities of light: angle, color, distribution, and movement.
- The basic functions of a modern computerized lighting control console.
- How to manipulate the four controllable qualities of light.

Project 2: Creating Stage Pictures

- Specific art-related vocabulary to describe a lighting composition.
- How to engage in artistic research regarding different qualities of light.
- How to use a small-scale lighting rig to assess the qualities of light based on a given 2-dimensional work of art.
- Designing a practical lighting composition uses two systems of complementary color and angle in order to create selected visibility, mood, time of day, and/or location.

Project 3: Tips and Tricks for working in a High School Level Lighting Plot

- How to create a “shopping list” and a “cue list” by identifying key elements from a script or “story” necessary for lighting a play, musical or dance piece.
- How to create a “magic sheet” based on an existing or planned light plot.
- The qualities and uses of common lighting fixtures found in most secondary schools’ inventory.
- How to assemble an accurate “equipment list” through knowledge of common lighting fixtures.
- How to calculate the size of a stage light from a given measurable position in a theater.
- How to calculate how a group of lights can form an effective, even “system” of lights from measurable locations in a theater. [sectioning a light]
- The basic paperwork types used to effectively plan, manage and maintain a stage lighting design.
- The vocabulary needed to build a “rental shop order” and to effectively interact with a local lighting rental shop.
- How to track a lighting design through a show using annotated cue lists, and scripts.

Project 4: Hands-on Session

- The basic architecture of a modern ETC based computerized lighting control console to patch, work in live and blind modes, write timed cues, and save and load files.



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

At the end of this unit, Students will be able to...

Project 1: Exploring Angles of Light with “Found” Lights

- Define the role of the lighting designer in the performing arts industry and beyond.
- Understand light as a technical and artistic tool for storytelling.
- Analyze and manipulate the four controllable qualities of light through three problem based lighting projects.
- Identify the basic functions of a modern computerized lighting control console.

Project 2: Creating Stage Pictures

- Employ art-related vocabulary to the qualities of light to effectively describe a lighting composition.
- Identify and analyze the different qualities of light in artistic research.
- Design a practical lighting composition on a given 2-dimensional work of art using a small-scale lighting rig.
- Design a practical lighting composition that uses two systems of complementary color and angle in order to create selected visibility, mood, time of day, and/or location.

Project 3: Tips and Tricks for working in a High School Level Lighting Plot

- Identify key elements from a script or “story” necessary for lighting a play, musical or dance piece and assemble those elements into a “shopping list” and a “cuelist”.
- Create a “magic sheet” based on an existing or planned light plot.
- Identify the qualities and uses of common lighting fixtures found in most secondary schools’ inventory.
- Apply knowledge of common lighting fixtures to assemble an accurate “equipment list”.
- Apply math to calculate the size of a stage light from a given measurable position in the theater.
- Apply math to calculate how a group of lights can form an effective, even “system” of lights from measurable locations in a theater. [sectioning a light]
- Identify the basic paperwork types used to effectively plan, manage and maintain a stage lighting design.
- Recognize the vocabulary needed to build a “rental shop order”.
- Construct a “rental shop order” to effectively interact with a local lighting rental shop.
- Track a lighting design through a show using annotated cue lists, and scripts.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Project 4: Hands-on Session

- Manipulate a modern ETC based computerized lighting control console to patch, work in live and blind modes, write timed cues, and save and load files.

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Observation
- Participation/Discussion
- Entrance and/or Exit Ticket
- Journal Entry
- Digital Tool:
 - Padlet
 - PowerPoint/Google Slide
 - Word or Google Doc
 - Kahoot
 - Flipgrid
 - StoryboardThat
- Lighting Equipment Quiz/Test
- Shopping List Task
- Equipment List Task
- Cuelist Task
- Magic Sheet Task
- Rental Shop Order Task
- Project/Presentation/Performance Specific Checklist or Rubric
 - Practical Light Composition Tasks
 - 2-dimensional work of art
 - Two systems of complementary color and angle
- Lighting Lab Scavenger Hunt



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Learning Activities:

Project 1: Exploring Angles of Light with “Found” Lights

Lesson A

Using found lights, household switches and dimmers and some simple means to gain height (like a step ladder), we set up some common angles of light (frontlight, backlight, diagonal backlight, high sidelight, low sidelight, footlights) to explore and talk about the observers’ associated feelings with different angles of light in a scene.

Assessment Activity:

- A. Describe the differences between the angles of light that you set up. What associations can you make between these angles of light and a real-world setting where these angles might occur?

Lesson B

Using found lights, household switches and dimmers, we will talk about lighting angle as a storytelling device. Connecting us while using these simple resources to the basic idea of lighting as a communication tool. Lighting Angle alone has the potential to strongly connect an audience to the world of a play or a dance or a piece of music. Set up a text-based scene and set up the lighting for the scene and play the scene. Talk about how the angles of light enhance the meaning and impact of the scene.

Assessment Activity:

- A. What was the underlying meaning of the lighting angles in the scene and how did the light relate to the characters in the scene and the given circumstances of the world that these characters inhabit?

Lesson C

Break out into smaller groups and create the lighting for your own curated scene text to communicate some idea of the scene to the audience through lighting angle. Come back together and ‘perform’ the scenes for the other groups. Discuss the effectiveness of the light as a communications tool.

Assessment Activity:

- A. What meanings and associations did the light acquire for you in the context of the scene?



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Project 2: Creating Stage Pictures

Lesson A: What are the qualities of light?

Using stage lights, building on your prior understanding of lighting angle to now explore separate qualities of light: **Color, Intensity, Form, Rhythm & Movement**

- **Color:** saturation; hue; white light; color complements; palettes; contrast; harmony; dissonance, color as a relative concept based on a total composition.
- **Intensity:** Intensity chords: low, medium, high, 0-100 ranges, brightness and intensity as a relative concept based on a total composition.
- **Form:** soft vs hard. solid vs texture, lighting as architecture vs light on an object, haze and atmospheric
- **Rhythm & Movement:** Tempo, Frequency, Flow (fluidity), Cue timing, Split Fades, Autofollows, Effects

Assessment Activities:

- A. List and describe the different qualities of light that you have encountered and could manipulate.
- B. Create a concept map to create associations among these qualities of light and real-world settings where these qualities of light occur, such as light in a living room or sunlight on a beach.
- C. Create a journal and write entries in which you see these qualities in the world around you.

Lesson B: What are the elements of composition?

Looking at painted images from multiple periods of world art history, describe the *light* in the image using all four qualities of light. What story does the light tell? How does that story contribute to the other stories embedded in the painting?

Discuss elements of composition: Foreground, middle ground, background; Visual Focus; Harmony vs. contrast; Balance (symmetry) vs. unbalanced (asymmetry)

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Assessment Activities:

- A. Look at paintings from multiple periods of art history within different cultures. See attached list for examples. (details to come) As a group, discuss how the artist used light to enhance the composition.
- B. Pick a painting that inspires you. Describe the lighting in the painting using your knowledge of the qualities of light. Describe how the light enhances your understanding of the image. Is there a story created or supported by the light? Is there depth in the image. Where does the artist lead your eye?

Lesson C: Create an effective lighting composition.

Break out into smaller groups and create a still-life composition using found objects (cans, glasses, blocks of wood, fabric swatches, books, utensils, everyday items) that have objects in the front, middle, and back of the available space. Using as many qualities of light as possible, create two light cues (lighting compositions) that reveal the three planes of objects in different ways. This can be built from the student group's imagination or inspired by a particular painting or artistic representation of their choosing. Write down your intent in fulfilling the prompt.

Assessment Activity:

- A. Present the work to the larger group. Ask the group to describe the qualities of light in the composition. Is the group able to discern the artistic intent of the student designers? Does the group's understanding of the composition comport with the written intent of the student designers? Discuss areas of understanding and areas of misunderstanding to illustrate the role of design as a communicative medium.



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Project 3: Tips and Tricks for working in a High School Level Lighting Plot

Lesson A: Reading a script for light

Break into groups. Ask each group to read a short scene and work together to identify the lighting requirements (shopping list, cuelist).

Assessment Activity:

- A. Group shares a description of the action of the scene and the resulting shopping list and cuelist with the larger group for discussion and critique.

Lesson B: Interactive Lecture

Facilitator shows common ways to construct a “magic sheet” based on ideas from the “shopping list” and perhaps the channel numbers in a plot. Principles for this paperwork include: everything fits on one page. Channel numbers are arranged graphically, usually respecting the point-of-view of the lighting designer’s position in the theater. Channels are grouped by “system” and arranged in a quasi-stage layout.

Assessment Activity:

- A. Participants work together to effectively create a magic sheet based on a given set of needs identified in a shopping list, with respect to a given light plot.

Lesson C: Common Stage Lights and their purposes

Part A: Break into three groups. Each group to cover a subset of commonly available stage lights:

Group 1: Pars, Parnels, Fresnels and their LED variants

Group 2: Ellipsoidals and their LED Variants

Group 3: Cyclorama Lighting Units and the LED variants

Assessment Activity:

- A. Each group creates a “concept map” of their unit types that connects both unit type capacities and possible use cases (ie, backlight or lighting a



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

backdrop). Groups then come back together to assemble a master concept map that integrates the three lighting unit families.

Part B: Break into three groups. Each group to cover a subset of commonly available stage lights:

Group 1: Pars, Parnels, Fresnels and their LED variants

Group 2: Ellipsoidals and their LED Variants

Group 3: Cyclorama Lighting Units and the LED variants

Assessment Activity:

- A. Each group creates a “concept map” of their unit types that connects both unit type capacities and possible use cases (ie, backlight or lighting a backdrop). Groups then come back together to assemble a master concept map that integrates the three lighting unit families.

Lesson D: Calculating the size of a Light, Calculating unit needs to implement a “system of light”

The size of a light can be calculated if you know the given degree of the lens and the distance from the light to the subject. $[\text{beam side diameter}] = \tan\left(\frac{[\text{lens degree}]}{2}\right) * [\text{distance from the light to the subject}] * 2$. You can use your iphone calculator to do this, 1) open the calculator app 2) turn your phone on its side to expose the scientific functions. to arrive at the size of the circle of light from a given distance with a certain lens: $[\text{lens degree}] / 2 [\tan] * [\text{distance from the light to the subject}] * 2 = \text{size of a circle of light}$. So for instance, a 36degree light at 20'-0" distance will yield a: 13' (12.996) circle of light.

Best practice to increase the size of an area beyond one light into a “system” of lights that all have the same purpose (i.e. “Sunlight”) is to place them on centers between $\frac{1}{2}$ to $\frac{1}{3}$ the size of the circle. So for instance in our example above, if the stage area that needs to be lit with this “system of lights is 28'-0" wide, you will need between $(28' / 6.5 (1/2 \text{ the diameter}) =)$ **4.3** and $(28' / 4.3 (1/3 \text{ the diameter} =)$ **6.5 lights**. **Since we cannot have a fraction of lights, we can round this to be either 5 or 6 lights.**

Assessment Activity:

- A. Given a 19degree stage light from a distance of 43 feet, how many lights will you need to cover a stage width of 40' evenly?



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

[answer] beam size at subject $\tan(19/2) * 2 * 43 = \tan(9.5) * 86 = 9.5 [\tan] * 86 = 14.39'$, or about **14'-5"**. ($.39 * 12 = 4.68 \sim 5$) ($.39/1 = x/12$).

$40' / 7.2 = 5.55$; $40' / 4.8 = 8.33$. So you'll need between **6 – 8** units or lighting instruments to make an even system across 40' of stage space with these lights.

Lesson E: Standardized Paperwork Methods for Working with Light in the Theater

Break into three groups. Each group to cover these paperwork types in common use for organizing show lighting information:

- Group 1: Plot and Hookup, Magic Sheet,
- Group 2: Section, Cuelist, Annotated Script, Research Images
- Group 3: Front Elevation, Sketches, Shopping List, Equipment List

Assessment Activity:

- A. Jigsaw: Group 1 breaks up and explains their paperwork types to groups 2 and 3. Then Group 2 breaks up and explains their paperwork types to groups 1 and 3. Then Group 3 breaks up and explains their paperwork types to groups 1 and 2. By going through the process of explaining their new knowledge, each "expert" group will deepen their understanding of their paperwork type.

Lesson F: Interactive Lecture

Facilitator shows an effective model of a professional shop order utilizing commonly requested lights for high school productions. Parts of the shop order to note: Cover page with dates, delivery information, billing information and contact information, subsequent item lists showing unit quantities and required spares, complete descriptions of units.

Assessment Activity:

- A. Participants work together to effectively create a shop order based on a given list of needed equipment.



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Lesson G: Interactive Lecture

Facilitator shows an annotated script for a play, a musical number and a dance work. Group discusses best practices for creating and maintaining this information. Then, the facilitator shares a cuelist type spreadsheet, showing columns for cue location, number, timing, purpose, and description.

Assessment Activities:

- A. Learners read a short play scene and annotate it with lighting cues. Learners create a cuelist based on the annotated script.
- B. Learners listen to a short song fragment and annotate it with desired lighting cues. Learners create a cuelist based on the annotated script.
- C. Participants create a dance script based on watching a short sequence on tape or live. Learners create a cuelist based on the annotated script.



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Project 4: Hands-on Session

Facilitator lectures and demonstrates the basic architecture of a modern ETC based computerized lighting control console with an emphasis on understanding: a) patching b) live and blind modes c) writing timed cues and d) saving and loading files.

Assessment Activities:

A. Lighting Lab Scavenger Hunt

In small groups, have students experiment with a modern ETC based computerized lighting control console through a cooperative learning Lighting Lab Scavenger Hunt unique to each group. As each group rotates to work at the console under the role of “designer”, the other groups should be completing their respective sections of either “audience,” “critic,” or “technician”.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Additional Teacher Resources:

- [*A Practical Guide to Stage Lighting*](#), Steven Louis Shelley
- [*Color & Light*](#), Clifton Taylor
- [*The Dramatic Imagination*](#), Robert Edmond Jones, especially Chapter VI on light and shadow design (handout)
- ETC, Electronic Theater Controls. For information about programming ETC manufactured consoles: <https://www.etcconnect.com/Support/Videos/>
- [*The Assistant Lighting Designer's Toolkit*](#), Anne McMills

Equipment Needed:

Project 1:

1. 3 to 6 - Clip Lights with Par38 Flood lamps for each breakout group. (total 10 for this project)
2. 1 to 3 - Plugging Strips
3. 6 - 20' extension household type cords
4. 10 - Black Tieline pieces to tie up cable (¼" cotton rope), each 18" long (optional)
5. 1 - Roll of Black Gaffer Tape (optional)
6. 3 - Ladders or some other way to safely mount lights at angles above people's heads.

Projects 2 and 3 (recommended by not necessary, can use the above equipment if necessary):

7. 4 to 6 - ColorSource LED type Pars or other LED based theatrical type lights with Clamps and Safety Cables (note: if using tungsten type theatrical lights, you will also need: dimming equipment, specialized power cabling.
8. 4 to 6 - Power Adapters: from the theatrical unit type to Edison Plug in order to provide power to the luminaire
9. 4 to 6 - Stands or other pipe equipment to mount the lights to various positions around a room or "light lab"
10. 1 - Theatrical computer control console to operate the lighting equipment, such as an ETC Element Console or a Nomad Puck.
11. Data cabling to connect the lights to the control console, probably DMX 5 pin cabling. A typical order for these lights in a classroom would be:
 - a. 4 - 25' DMX 5 pin cables
 - b. 2 - 50' DMX 5 pin cables



Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

Handouts:

- Magic Sheets
- Light Plots
- Sections
- Front Elevations
- Hookups
- Sketches
- Script Suggestions::
 - Fragments from Dance, Theater and Musicals



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

ACCOMMODATIONS

504 Accommodations:

- Provide scaffolded vocabulary and vocabulary lists.
- Provide extra visual and verbal cues and prompts.
- Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials.
- Provide links to audio files and utilize video clips.
- Provide graphic organizers and/or checklists.
- Provide modified rubrics.
- Provide a copy of teaching notes, especially any key terms, in advance.
- Allow additional time to complete assignments and/or assessments.
- Provide shorter writing assignments.
- Provide sentence starters.
- Utilize small group instruction.
- Utilize Think-Pair-Share structure.
- Check for understanding frequently.
- Have students restate information.
- Support auditory presentations with visuals.
- Weekly home-school communication tools (notebook,

daily log, phone calls or email messages).

- Provide study sheets and teacher outlines prior to assessments.
- Quiet corner or room to calm down and relax when anxious.
- Reduction of distractions.
- Permit answers to be dictated.
- Hands-on activities.
- Use of manipulatives.
- Assign preferential seating.
- No penalty for spelling errors or sloppy handwriting.
- Follow a routine/schedule.
- Provide students with rest breaks.
- Use verbal and visual cues regarding directions and staying on task.
- Assist in maintaining an agenda book.

IEP Accommodations:

- Provide scaffolded vocabulary and vocabulary lists.
- Differentiate reading levels of texts (e.g., Newsela).
- Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials.
- Provide extra visual and verbal cues and prompts.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- Provide links to audio files and utilize video clips.
- Provide graphic organizers and/or checklists.
- Provide modified rubrics.
- Provide a copy of teaching notes, especially any key terms, in advance.
- Provide students with additional information to supplement notes.
- Modify questioning techniques and provide a reduced number of questions or items on tests.
- Allow additional time to complete assignments and/or assessments.
- Provide shorter writing assignments.
- Provide sentence starters.
- Utilize small group instruction.
- Utilize Think-Pair-Share structure.
- Check for understanding frequently.
- Have students restate information.
- Support auditory presentations with visuals.
- Provide study sheets and teacher outlines prior to assessments.
- Use of manipulatives.
- Have students work with partners or in groups for reading, presentations, assignments, and analyses.
- Assign appropriate roles in collaborative work.
- Assign preferential seating.

- Follow a routine/schedule.

Gifted and Talented Accommodations:

- Differentiate reading levels of texts.
- Offer students additional texts with higher lexile levels.
- Provide more challenging and/or more supplemental readings and/or activities to deepen understanding.
- Allow for independent reading, research, and projects.
- Accelerate or compact the curriculum.
- Offer higher-level thinking questions for deeper analysis.
- Offer more rigorous materials/tasks/prompts.
- Increase number and complexity of sources.
- Assign group research and presentations to teach the class.
- Assign/allow for leadership roles during collaborative work and in other learning activities.

ELL Accommodations:

- Provide extended time.
- Assign preferential seating.
- Assign a peer buddy who the student can work with.
- Check for understanding frequently.



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- Provide language feedback often (such as grammar errors, tenses, subject-verb agreements, etc...).
- Have students repeat directions.
- Make vocabulary words available during classwork and exams.
- Use study guides/checklists to organize information.
- Repeat directions.
- Increase one-on-one conferencing.
- Allow students to listen to an audio version of the text.
- Give directions in small, distinct steps.
- Allow copying from paper/book.
- Give students a copy of the class notes.
- Provide written and oral instructions.
- Differentiate reading levels of texts (e.g., Newsela).
- Shorten assignments.
- Read directions aloud to students.
- Give oral clues or prompts.
- Record or type assignments.
- Adapt worksheets/packets.
- Create alternate assignments.
- Have student enter written assignments in criterion, where they can use the planning
- maps to help get them started and receive feedback after it is submitted.
- Allow students to resubmit assignments.
- Use small group instruction.
- Simplify language.
- Provide scaffolded vocabulary and vocabulary lists.
- Demonstrate concepts possibly through the use of visuals.
- Use manipulatives.
- Emphasize critical information by highlighting it for the student.
- Use graphic organizers.
- Pre-teach or pre-view vocabulary.
- Provide students with a list of prompts or sentence starters that they can use when completing a written assignment.
- Provide audio versions of the textbooks.
- Highlight textbooks/study guides.
- Use supplementary materials.
- Give assistance in note taking
- Use adapted/modified textbooks.
- Allow use of computer/word processor.
- Allow students to answer orally, give extended time (time-and-a-half).



STUDIO SCHOOL OF DESIGN

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- Allow tests to be given in a separate location (with the ESL teacher).
- Allow additional time to complete assignments and/or assessments.
- Read questions to students to clarify.
- Provide a definition or synonym for words on a test that do not impact the validity of the exam.
- Modify the format of assessments.
- Shorten test length or require only selected test items.
- Create alternative assessments.
- On an exam other than a spelling test, don't take points off for spelling errors.



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Secondary Educators Lighting Unit Plan

New Jersey Interdisciplinary Connections and Standards:

Career Readiness, Life Literacies, and Key Skills:

9.2 CAREER AWARENESS, EXPLORATION, AND PREPARATION

- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
- 9.2.8.B.4 Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.2.12.C.4 Analyze how economic conditions and societal changes influence employment trends and future education.
- 9.2.12.C.6 Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.

9.3 CAREER & TECHNICAL EDUCATION (CTE)

- 9.3.12.AR-PRF.7 Describe how technology and technical support enhance performing arts productions.

Social & Emotional

- SEL.PK-12.1.3 - Recognize one's personal traits, strengths, and limitations.
- SEL.PK-12.1.4 - Recognize the importance of self-confidence in handling daily tasks and challenges.
- SEL.PK-12.2.2 - Recognize the skills needed to establish and achieve personal and educational goals.
- SEL.PK-12.2.3 - Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals.
- SEL.PK-12.3.1 - Recognize and identify the thoughts, feelings, and perspectives of others.

Secondary Educators Lighting Unit Plan

Secondary Educators Lighting Unit Plan

- SEL.PK-12.5.2 - Utilize positive communication and social skills to interact effectively with others.

Math: Trigonometric Functions F-TF

A. Extend the domain of trigonometric functions using the unit circle.

1. Understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
3. (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for πx , $\pi+x$, and $2\pi-x$ in terms of their values for x , where x is any real number.
4. (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions

B. Model periodic phenomena with trigonometric functions.

5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
6. (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology and interpret them in terms of the context.

C. Prove and apply trigonometric identities

8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
9. (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.



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Secondary Educators Lighting Unit Plan

Science

MS-PS4 Waves and Their Applications in Technologies for Information Transfer

- MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.