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START





Introduction to Residential Lighting Design



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Introduction to Residential Lighting Design

Presented By: Eaton 1121 Highway 74 South Peachtree City, Georgia 30269

Description: This course provides an overview of the processes used in residential lighting design and includes discussions on types of lamps, types of lighting fixtures including recessed lighting, the Layered Lighting System and room lighting techniques.

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Learning Objectives

At the end of this program, participants will be able to:

- distinguish between color temperature (Kelvin) and color rendering (CRI) and discuss how to incorporate these key elements in the design process
- describe various types of lamps used in residential design and determine which is best to use to achieve the desired illumination levels
- analyze a living space to determine the lighting effects required and choose the luminaries needed to best meet those requirements, and
- identify the four main categories of the "Layered Lighting Method" and utilize this method when constructing residential lighting designs in order to meet both the functional and aesthetic requirements of the design.



• About the Instructor

Table of Contents

Introduction	9
How We See	10
Lamps for Residential Use	14
Lighting Residential Spaces	32
Recessed Lighting - Types of Downlighting Trims	44
Room Lighting Techniques	52
Summary	89



Glossary

- **A Lamp** This refers to a regular household light bulb.
- Accent Lighting Lighting directed toward an object in order to direct attention to it
- Ambient Lighting The light that fills the entire room with illumination
- **Beam** The size and shape of the pattern produced by a light bulb
- Color Rendering Index (CRI) This is a scale used to evaluate how well a lamp source makes colors appear as compared to noon sunlight.
- Color Temperature (Kelvin) A measurement used to compare the whiteness of a light source
- **Downlight** A luminaire that directs light towards the ground
- Efficacy The scale by which a luminaire is measured in producing light
- Fluorescent Lamp An energy-efficient lamp that produces light by the use of UV light, phosphors and a ballast to run it
- **Incandescent Lamp** A light bulb that creates light when electricity flows through a filament causing it to glow. This is an inefficient light source.

Glossary

- LED Light emitting diode
- Low Voltage A lamp type requiring a transformer using currents less than 40v
- Lumen The measurement of light that falls on one square foot of surface from one foot away
- **MR Lamps** Mirror reflector lamps that throw light in a given direction
- PAR Lamps Parabolic aluminized reflector lamps that direct light in a number of different beam patterns
- **R Lamp** An incandescent lamp with a built-in reflector
- **Sconce** A decorative luminaire mounted on a wall
- Task Lighting A directed light to a surface free from glare and shadows
- **Uplighting** Lighting directed towards the ceiling
- Wall Washing Lighting is spread evenly over a vertical surface from a light source

Introduction

Illumination

- Light has been a factor influencing the human mind since the beginning of time. One hundred and fifty years ago, man harnessed its effect with the invention of the incandescent lamp. In the last 20 years, advancements in lighting have provided great opportunities for the lighting designer to create illumination in a space.
- With our ever-changing lifestyles, we will review how illumination can influence what surrounds us. The results can be from subtle to dramatic; and more than anything, we realize that lighting aids us in the ability to perform functions in a given area.
- Randall Whitehead stated it best when he said, "What you will learn is how to paint with illumination, using various techniques to add Depth, Dimension and Drama (the three D's) while at the same time humanizing your environment."¹

¹Source: Whitehead, Randall. *Residential Lighting: A Practical Guide 2003*. John Wiley & Sons Inc., 2004.



Introduction

 The majority of the time, the light that we see by is the light that is reflected from a surface. By understanding some basic illumination principles, you can make knowledgeable decisions in your lighting choices.



The Color of Light

 Color temperature (Kelvin) and color rendering (CRI) are two very important keys to how interior design and lighting intersect. All lamp sources illuminate with a certain color. This color will affect the color in the space. Color temperature is a measurement of how warm or cool the color is that emanates from a white light source. The more blue, the cooler the source and the higher the Kelvin number; the more yellow, the warmer the source and the lower the Kelvin number.



2700K Warm



4100K Cool



The Color of Light

 The lighting designer first needs to choose the Kelvin temperature of the light source based on the colors used in the space. In the U.S., residential spaces are usually illuminated with 2700K, a warm light — firstly, because that is the color temperature of our incandescent lamps, and secondly, we have been conditioned for that light color use in our homes. The residential light source will also require a CRI of >80. The CRI of the incandescent family of lamps is 100, and fluorescents used in the home are available in the Kelvin temperature of 2700K, with a CRI in the 80's or greater.



The Color of Light

 When we discuss the ability of a light source to render a color or show the color hue, we refer to this as its color rendering index (CRI). Natural daylight from the sun is a full spectrum cool light source; it gets the number, or score, of 100. All light sources 5000K or greater are compared to natural daylight; the closer the light source to daylight in its CRI, the higher its score. All light sources less than 5000K are compared to the incandescent lamp. The group on the left is illuminated by a light source with a CRI greater than 90, and the right, a CRI of 70.



CRI>90

CRI 70



Lamp Sizes and Types

 Choosing the correct lamp is a significant factor in producing the desired effect. Beam control is the key to effective, efficient lighting. The combination of the right lamp in the right fixture can maximize efficiency and produce the desired lighting effect.



What Lamp Type Is Best?

 There are numerous lamp types available to the lighting designer today. Many incandescent, halogen, low voltage, compact fluorescent, linear fluorescent lamps, and LED's have seen great improvements in length of life, energy savings and beam control. When choosing the lamp, one must determine the desired Kelvin temperature, wattage and beam distribution.



Incandescent Lamps (A)

 Incandescent lamps are available in a variety of shapes, sizes and wattages. The most economical in upfront costs are A lamps that are utilized in a wide range of recessed lights, reflector trims, and wall washers. A lamps provide a pleasing general light source and are warm in color appearance, but have a very short life of about 750 hours.



2750K - CRI 100 750 hours

Lamps for Residential Use

Incandescent Lamps (BR & R)

Incandescent lamps that will be discontinued in 2012 are the R and BR lamps with built-in reflectors. These lamps are most effective when used with reflector cones, baffles, and adjustable trims to create a range of effects: downlighting, task lighting and directional accent lighting. R and BR lamps contain an internal reflectorized coating that creates distribution patterns ranging from spot to flood. These lamps are well-suited for accenting and wall washing where directional control is desired. The wide beam lamps can also be effectively used for general lighting. They have a lifespan of 1000 - 1500 hours.



2750K - 3000K - CRI 100 1000 - 1500 hours

Lamps for Residential Use

Incandescent Lamps (PAR)

 PAR lamps are reflector lamps that deliver a stronger punch of light compared to BR lamps, with better beam control. PAR lamps also contain an internal reflectorized coating and a prismatic lens to maximize beam concentration. Most of these lamps contain a halogen gas to improve performance. The PAR30 size comes in both a short and long neck version. The average lamp life is 2000 hours. As we move into 2012, these lamps will need to meet restrictive efficiency requirements.



3000K - CRI 100 2000 hours

Lamps for Residential Use

Low Voltage Lamps (MR)

 A transformer in the fixture steps down 120V line voltage to the 12V required for this lamp. The development of smaller lamps, such as the low voltage MR16, made it possible to create a family of ultracompact recessed housings. At 12V operation, a more tightly wound tungsten filament produces an increased point source for better optical control and beam distributions, from very narrow spot to wide flood. They have a lifespan of 2000 - 4000 hours.



3200K - CRI 100 2000 – 4000 hours

Lamps for Residential Use

Line Voltage Lamps (MR)

 The development of the line voltage incandescent MR16 lamp has made it possible to create a family of ultracompact recessed housings with no transformers. Lamp life is very short, 750
1500 hours, and due to the larger filament, the lamp does not have the optical control and lumen output of its low voltage counter part.



2750K - CRI 100 750 – 1000 hours



Compact Fluorescent

 These lamps have a long life (12,000 hours), high light output, and excellent color rendering. They are an excellent choice for smooth, broad beam downlighting, especially in areas with long maintenance cycles. Their very good color rendering and assortment of Kelvin temperatures allows mixing with incandescent lamps. Dimming is possible to 5% of total lumen output with optional dimming ballasts and select fluorescent dimmers.

> 3000K – 5000K CRI >80 12,000 hours



Lamps for Residential Use

Eco-Twist[™] Fluorescents

These new compact fluorescent lamps are available in 16, 21 and 28 watts with long life (10,000 hours), high lumen output, and excellent tri-phosphor color rendering, with an enhanced R9 phosphor for cosmetic appeal. They are an excellent choice for smooth, broad beam downlighting, especially in areas with long maintenance cycles. Their excellent color rendering allows mixing with incandescent lamps. These lamps are interchangeable in the recessed downlight due to a smart ballast system. If light output is too high or too low in a given area, the user may simply change the lamp to the needed wattage.



2700K CRI >86 10,000 hours

Lamps for Residential Use

T8 Fluorescents

 Among the improvements in fluorescent linear lamps are smaller diameters. The T8 lamp, with its newer families of electronic ballast technology and improved lamp phosphors, will give very good illumination with high efficiency. The available range of different Kelvin temperatures and assortments in color renderings will work well with matching incandescent lamp sources. The T8 lamp replaces the older T12 lamp, giving greater lumen levels with even less energy consumption and longer life.



Lamps for Residential Use

T5 Fluorescents

 The newest in linear fluorescent lamps is the electronic ballasted T5. With improved lamp phosphors and availability in high output, this lamp can give high illumination values where needed. It is available in a range of different Kelvin temperatures and has excellent color rendering properties. This lamp will work well with matching incandescent lamp sources if needed.



LED's

Today's LED's for residential use give us the Kelvin temperatures needed to match both incandescent and fluorescent lamp sources. Color rendering is very good and equal to that of the compact fluorescent and can be dimmed as easily as an incandescent lamp. With very long life and very good efficacies, this new lamp source is replacing many conventional incandescent sources, and in some cases, compact fluorescents.



- Residential use LED's are 3000K 4100K
- CRI is >80
- Dimmable to 5%
- Long Life 50,000 hours
- Emits no UV



Lamps for Residential Use

LED - Revolutionary Lighting Technology

- An LED (Light Emitting Diode), also referred to as Solid State Lighting (SSL), is composed of various semiconductor materials. When an electrical current passes through the diode, the recombination of positive and negative charges results in the emission of photons, or light.
- Environmental and legislative awareness continues to drive demand for energy-efficient lighting solutions. LED luminaires, lamps, and modules are alternatives to less efficient light sources, such as fluorescent and incandescent.



Lamps for Residential Use

LED - Features and Benefits

 Energy Saving - Changing one incandescent lamp to an LED lamp will save hundreds of dollars over the life of the fixture. Changing multiple lamps will significantly lower your electric bill and change how you view lighting. The use of an LED luminaire or lamp is more efficient than traditional light sources, consuming 75% less energy than a 65 watt incandescent lamp.



LED - Features and Benefits

- LED's are solid state devices that do not have filaments or glass components that could break. The light source is not susceptible to vibration, thus reducing the risk of premature failure.
- LED's contains no UV.
- The LED design delivers over 70% of the initial light output long after 50,000 hours of operation. The sustainability of the LED fixtures dramatically reduces maintenance costs over traditional sources.
- LED's are available with a CRI >80 and Kelvin temperatures from 2700 – 5000K, thus making the LED a great replacement for today's incandescent and compact fluorescent lamps.



Lamps for Residential Use

LED - Features and Benefits

- Carbon Footprint LED lamps and luminaires reduce the energy demands of commercial spaces.
- LED's thereby reduce carbon emissions, which are a primary cause of the "greenhouse effect" leading to global warming. Using less watts will also decrease the use of air conditioning in the warm summer months.



LED – Sustainability

 The Environment - LED lighting helps conserve the planet's resources while helping to achieve significant energy cost savings. The LED is mercury-free, PCB-free, and lead-free and does not need special handling to dispose of properly. The LED solution reduces carbon emissions and conserves natural resources while diminishing the concerns of toxic substances in the water supply resulting from improper disposal. With LED's, it is easy to be environmentally responsible.

Residential Lamps Comparison

Type of Lamp	Kelvin Temperature	Color Rendering Index	Lumens Per Watt	Initial Costs	Efficiency	Average Life Hours
Inc. A	2700K	100	18	Inexpensive	Very Poor	550-800
Inc. R	2700K	100	18	Inexpensive	Very Poor	1000-1500
Inc. Halogen PAR	3000K	100	20	Reasonable	Fair	2000
Inc. Line MR	2750K	100	18	Inexpensive	Poor	800-1500
Inc. Low Volt MR	3050K	100	20	Reasonable	Average	2000-4000
Eco-Twist™	2700K	86	40	Slightly Expensive	Above Average	10,000
Compact TTT	2700K-5000K	>80	40	Slightly Expensive	Above Average	12,000
T12 Fluor	2700K-4100K	60-90	60	Reasonable	Average	20,000
Т8	2700K-5000K	60-90	90	Slightly Expensive	Above Average	30,000
Τ5	2700K-5000K	>80	90	Expensive	Above Average	30,000
LED's	2700K-5000K	>80	40	Very Expensive	Above Average	50,000

Questions to Ask

There are many decisions that affect the placement of fixtures and the type of fixture utilized in a space. When illuminating residential spaces ask the following questions:

- What type of activities will take place in this space?
- What tasks will be performed in this space, and by whom?
- What items of furniture, pictures, and decorative accessories do we want to illuminate?
- Where will people sit?
- What type of mood do we want the space to convey, and should that mood be able to change?
- What are the decorating tastes, and how can the lighting enhance that design style?



Helpful Hints...

- Wall accenting or wall washing can give the room a feeling of size. Lighting this area will make the room appear more spacious.
- Using light to accent furniture will create contrast, and in turn, convey intimacy in the room.
- A festive mood can be accomplished by the use of reflection. Light can create sparkle on cut crystal, glass and metallic surfaces.
- Indirect and cove lighting in a ceiling can make a space more formal, as well as more spacious.
- Hardwood floors, floor tile, and rugs when illuminated with recessed downlights, can make a room feel more inviting and warm.



Step One

Determine the lighting effects required room by room

• Although the lighting requirements will vary in different areas of the residence, they will generally fall into the four main categories of the "Layered Lighting Method."



Definition of Terms

General/Ambient Lighting

 This type of lighting provides general illumination in a space. This effect gives the room a feeling of intimacy and warmth.







Definition of Terms

Accent Lighting

• This type of lighting creates drama by giving additional light to objects and surfaces. This is the lighting that draws the eye of the viewer towards the object that is illuminated; it creates excitement!






Definition of Terms

Wall Wash

• This type of lighting spreads light to evenly illuminate walls.







Definition of Terms

Task Lighting

Higher levels of light are needed in a where work is being performed.





Remember that these lighting layers are used in combination to give the final \bullet illumination to the space.

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Step Two

Determine the type of luminaire desired

- The type of lamp and type of luminaire being used determines the selection of lighting effects available for you to choose from in order to produce the desired lighting and architectural element.
- Here are just a handful of several different types of fixtures available to fill your residential lighting needs:
 - 1) Recessed Downlighting
 - 2) Track Lighting & Pendants
 - 3) Fluorescent Fixtures
 - 4) Table, Floor Lamps and Torchieres
 - 5) Decorative Lighting for Interior
 - 6) Decorative Lighting for Exterior
 - 7) Landscape Lighting
 - 8) Emergency Lighting





• Ask an Expert

Lighting Residential Spaces

Choosing the Decorative Luminaire

 Choosing the type of fixtures can be both a functional as well as a design decision. Ask yourself if there is a need for controlling beam spreads in the area? Does the aesthetics of the fixture go with the décor of the room? How will I mount this fixture: wall sconce, pendant, surface, track, or recessed? Am I remodeling, or is this new construction? How easily can I maintain the lighting fixture? And finally, what is the budget?





Step Three

Find out how to save energy dollars

 Rising energy costs call for fixtures that are energy efficient while still performing the lighting effect required. Lower wattage sources such as fluorescent, LED, airtight recessed housings, and low voltage track provide energy savings. Combining these luminaires with the use of lighting controls such as dimmers, timers, and photocells, will help make a difference in an energy savings design.



How Much Light Is Needed?

- According to the IESNA (Illuminating Engineering Society of North America), there are three main factors that determine the required amount of light for good vision in a space:
 - 1. The age of the people using the lighting
 - 2. The speed and accuracy needed for the task
 - 3. The reflectance of the surfaces being illuminated
- The following page is a chart taken from the IESNA Manual, 9th Edition, and is a guide for the lighting practitioner as he or she makes illumination recommendations throughout the residential space.

I. INTERIOR		Very Important					Important				Somewhat important					Blank = Not important or n / a								
LOCATIONS AND TASKS																								
lesign Issues	ppearance of Space and Luminaires	olor Appearance (and Color Contrast)	aylighting Integration and Control	birect Glare	licker (and Strobe)	ight Distribution on Surfaces	ight Distribution on Task Plane (Uniformity)	uminances of Room Surfaces	Iodeling of Faces or Objects	oint(s) of Interest	teflected Glare	hadows	ource/Task/Eye Geometry	parkle/Desirable Reflected Highlights	unface Characteristics	ystem Control and Flexibility	pecial Considerations	lotes on Special Considerations	luminance (Horizontal)	lorizontal Footcandles	luminance (Vertical)	ertiical Footcandles	lotes on Illuminance - see end of section	teference Chapter(s)
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General lighting																				5				\vdash
Conversation, relaxation, and entertainment																				3		3		
Passage areas (circulation)																				3		3		
Makeup and shaving																				30		5		
Dressing evaluation (mirror)																				30		5		
Handcrafts and hobbies																								
Ordinary tasks (e.g,. crafts)																				30		5		
Difficult tasks (e.g., sewing)																				50		10		
Critical tasks (e.g., workbench)																				100		30		
Easel hobbies																						30		
Ironing																				30				
Kitchen counter																								
Critical seeing (e.g., cutting)																				50		10		
General																				30		5		
Kitchen range																								
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Kitchen sink																				50		10		
Difficult seeing																				50		10		
Noncritical (clean up)																				30		5		
Laundry																				30		3		
Music study (plano, organ)																				30		5		
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IESNA Manual – 9th Edition

Putting the Light Where You Want It!

- The light beam (distribution) is decided by two key factors: first, the type of lamp being used, and second, the type of lighting fixture selected to support the lamp.
- The recessed downlight, unlike most residential luminaires (lighting fixtures), has the greatest amount of internal optics to direct light. It can control glare and eliminate the undesirable lamp image.
- Depending on the required lighting layer general, accent, wall wash or task — the recessed housing, trim, and lamp gives the greatest selection of lighting effects needed to create the desired lighting design.



Reflectors

 Reflector trims are full cones for non-beam forming lamps that create wide light patterns and maximize the efficiency of the light source. They are especially well-suited for general service A lamps and energy efficient compact fluorescent lamps. These trims fully surround the lamp source and direct light into a desired beam; they work by using their optical design to reflect parallel rays of light to the space below. The use of colored reflectors will enhance the light; thus, gold finished reflectors add warmth.





Reflector Cones

 Reflector cones are for beam forming lamps — PAR's, BR's, and R's — that provide cutoff and glare control. They direct the full output of these lamps to the illuminated task. As seen in the previous slide, we can use color to enhance the space, and we can use black Alzak to control glare.





Baffles

 Baffle trims trap and shape light to minimize glare and reduce ceiling brightness. Baffles narrow the focus of the downlighting beam and control reflector style lamps (R, BR, and PAR lamps). Baffles are stepped or grooved to block stray light and are available in black to absorb and help eliminate glare. Today, many homes use white baffles; this color will not reduce glare, but will help the trims blend into the ceiling when lights are turned off.





Eyeballs/Adjustables

 These trims provide precise, variable directional lighting. They are especially useful for directing light to accent areas, wall hangings, mantles, and task areas. Quality accent lighting depends upon the type of lamp being used and the angle of the light hitting the illuminated surface. Eyeball trims extend below the ceiling plane, but pinspots, slots, and recessed accent luminaires can create great effects with little or no visible light.





Wall Washers

 Wall wash trims provide vertical surface illumination. Special reflectors allow both wall washing and downlighting. Depending on the light source and fixture positioning, these trims will provide uniform, smooth, scalloped, or asymmetric lighting patterns. Eyelid wall washers provide little downward light and illuminate the room by the light reflecting off the wall. Most insulated ceiling recessed housings will have difficulty illuminating walls from high ceilings due to the required lower wattage lamps.





Lenses and Diffusers

 Lenses and diffusers are designed to soften, focus, or spread the light of economical general service A lamps, compact fluorescents, and LED's. Some trims can be wet location listed and are used in shower areas while others can be used in closets. Enclosed downlights are used to keep dirt and moisture out. Using an airtight housing will also help keep the bugs out.





Open Trims

 The simplest and most economical choice for recessed downlighting is open trims, which can create an attractive finished look without compromising the natural efficiency of reflector style lamps. Be careful, as these units may create high brightness from the lamp image.







Kitchen

 The kitchen is fundamentally the work area for meal preparation and clean-up. Today's kitchens have become the area of the house for entertaining, and other activities such as homework, games, and crafts. Walls between kitchens, dining rooms and family rooms have in many cases disappeared. The lighting designer's goal is to make the space functional, comfortable and beautiful.

Here, the lighting is a combination of all the layers — general, accent, task, and wall washing — with a fair amount of lighting control.





Kitchen

 General lighting is required to direct light into cabinets and drawers and for moving within the space. This is accomplished by a set design of downlights or a surface mounted fluorescent unit. Note: The fluorescent will give you the greatest amount of illumination for the least amount of energy consumed, and very little shadow. Today's recessed downlights are very flexible and can be positioned to give you even illumination throughout the space. The average illuminance here should be about 10 - 20 footcandles.





Kitchen

 Task lighting is required at the counter, sink and stove areas. The lighting should be placed in front of the person to prevent shadows; it also needs to be shielded from those seated to prevent glare. Sometimes pendants are added to increase the task light in areas. Reading is usually done at the kitchen table or countertops. Illuminance here can fluctuate from 20 - 100 footcandles.







Kitchen

 Accent lighting is used to highlight objects throughout the kitchen such as artwork, tile, display shelves, or a note board. This will bring interest not only to the objects illuminated, but to the kitchen as a whole. Illuminance here is from 50 - 200 footcandles.







Kitchen

 Lighting controls are important and allow for the increase in the level of illumination when required, and the decrease when not required or when there is a desire to set a mood.
Remember that both energy savings and lamp life are extended when dimming incandescent lamp sources.





Kitchen

Rules of Thumb

- 1. At the sink, use a concentrated beam from a recessed downlight directly above or from each side (50 footcandles).
- 2. Relying on a light only from the center of the room puts shadows on the countertop work area.
- 3. Task lighting must be at the front edge of the cabinet and needs to be shielded from view from those seated close by (30 - 50 footcandles).



Kitchen

Under and In-Cabinet Task Lighting

 Place under cabinet lights or low voltage task lights at the front edge of the cabinet. Shield the lights with a fascia so you cannot see the light from a seated position or adjacent room.





Bath and Powder Room

 Task lighting at the mirror is necessary for grooming. Illumination levels (30 footcandles) must be both even and plentiful on the face, hair, and neck, and without shadows. Care is needed when placing light above the grooming area. Although this is fine for general lighting, it causes shadows on the face.





Bath and Powder Room

 When using fluorescent as general lighting, the source must have both good color rendering and a good color temperature. As in the kitchen, the fluorescent will give off less heat and use less electricity. Incandescent lamps, if correctly spaced and diffused, can also be used in this area. The illuminance here should be 20 - 50 footcandles.





Bath and Powder Room

 Areas around the tub and toilet can use recessed downlights or surface mounted fixtures. These units are especially good for those who like to read. The illuminance here should be between 10 - 20 footcandles. Written in the National Electrical Code (NEC), recessed downlights located in showers or within 8 feet of the water line must be enclosed.







Bath and Powder Room

 Lighting controls in the bathroom space are a big plus. They allow for the control of night lighting; permit us to adapt the lighting to our needs; and, they help set the drama and the mood of the space. Levels can be increased for makeup application or personal hygiene.







• Ask an Expert

Room Lighting Techniques

Bath and Powder Room

Rules of Thumb

- 1. Long, decorative units light the mirror area by giving off even illumination (30 footcandles).
- 2. Wet location approved fixtures are needed in tub and shower areas.
- 3. Have dimming switches located close to the areas that need to be controlled, but within the guidelines of the national electrical codes.









Foyer or Entryway

 The foyer is where the first impression of the home is made: the transition between public and private space, from outdoor to indoor lighting (3 - 5 footcandles). It is important to make a smooth transition from one level of light to another, whether it be day or night.



Foyer or Entryway

 General lighting in this space may be provided by a large chandelier or pendant fixture. This luminaire will set the decorative tone for the space. Many times, wall sconces will be put on either side of a mirror to help guests in adjusting a hat, hair, or attire. Close-to-ceiling decorative units add needed light to adjoining hallways in the space. Typically, 10 - 20 footcandles is needed.





Foyer or Entryway

- Task lighting is provided by recessed downlights to help in light distribution along stairways. Be careful to keep illumination levels even to help make travel glare-free when descending or ascending the stairway (10 - 20 footcandles).
- Lighting controls can set the scenes for daily use, special family get-togethers, or the holidays.





Foyer or Entryway

Rules of Thumb

- 1. The bottom of the ceiling fixture or chandelier should be at least 7 feet from the floor. That may mean you need a flush mount (mounts directly against the ceiling), a semiflush (also known as close-to-ceiling fixture, which hangs a few inches below the ceiling) or, if you have a tall ceiling, you may need a 2-tier or 3-tier chandelier.
- 2. If there is a window above the front doors, center the chandelier in the window so it can be seen from the outside.
- 3. If the foyer is extra large, you may also want to include wall sconces in the foyer. Install them on the wall approximately 60" from the floor, 6 8 feet apart.

• Ask an Expert

Room Lighting Techniques

Living Room and Great Room

- Great rooms and living rooms serve many different activities. The lighting needs to be adjustable enough to change with the needs of the space (3 - 30 footcandles).
- Whether there is a vaulted ceiling, a stone fireplace, a niche for art objects, a wall of artwork, a bookcase, a bar, or a place to read a good book, the right illumination and lighting layers will make the room look more comfortable and beautiful.



• Ask an Expert

Room Lighting Techniques

Living Room and Great Room

The focal point in the living room is often the fireplace. Here, our main objective is to highlight texture and colors of the stonework. Artwork and objects on the mantle (30 - 100 footcandles) need to be illuminated. The illumination here is 5 - 20 footcandles on the rest of the fireplace wall.





Living Room and Great Room

 General lighting should give us ease to move about the space. This is supplied by reflections of light off furnishing and walls.
Illuminance here will be 10 - 20 footcandles.





• Ask an Expert

Room Lighting Techniques

Living Room and Great Room

 Task lighting here will help the home owner by providing extra light to play a game with family members, read a book at a favorite chair, or play a tune on the piano. Illuminance here will be from 20 -50 footcandles.


Living Room and Great Room

Rules of Thumb

- 1. Lighting artwork in this space requires aiming the light 30 degrees from the vertical surface. Lighting placed out at greater angles can cause glare back at the viewer, and lighting placed at lesser angles can cause unwanted shadows from the frame.
- 2. When lighting a group of pictures, it is best to do it as a whole rather than individually. Use multiple lighting units to give even illumination; spreading lenses on MR lamps is a good idea, especially when lighting a very large piece of artwork.
- 3. For a textured surface, place fixtures close to the wall surface, which causes a grazing angle and enhances the texture. If there are irregularities on the wall, place units farther away and wash the wall.
- 4. When wall washing, the surface is illuminated evenly from top to bottom. This effect makes the space look larger and increases uniform brightness in the space.

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Living Room and Great Room

How to determine the location of the recessed luminaire for the lighting of artwork





Living Room and Great Room

Rules of Thumb cont'd

- 5. Three-dimensional objects require two light sources: one wide beam from 30 to 45 degrees left or right in front and above, and one narrower beam aimed just the opposite.
- 6. Glass vases or pieces of art glass are best seen resting on a glass shelf lit from above.
- 7. When using table and floor lamps, the bottom of the lampshade should be approximately 42 inches from the floor's surface. Desk lamps should be 16 inches above the work surface and 13 inches from the front of a desk. A torchiere can be used to light dark corners; it can be from 66 to 72 inches from the floor.



Dining Room

 Lighting in the dining room needs to make the people, the table setting, the food, and prized possessions look their best. It must be flexible enough to provide for different activities at the table and around the room. The lighting plan needs to light the table, china cabinets, artwork, and any other focal points in the room.



Dining Room

 The focal point of the room is the dining room table; the goal here is to enhance the colors and textures of the food being served and to make sure that guests look their best. Again, like in the rest of the home, both color temperature and good color rendering lamps are necessary here to make sure complexions and the attire of the diners look natural. Illuminance here should be between 10 - 20 footcandles.



Dining Room

 The general lighting serves to meet the flexibility of the room, from a sitdown dinner, to a buffet or cocktail party. Illuminance here is 5 - 10 footcandles.





Dining Room

 Accent lighting brings objects in the room alive: collectables, artwork, flower arrangements, crystal, and even the china.
Illuminance on the table is 25 - 50 footcandles and 100 - 250 footcandles on the artwork.



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Dining Room

 Lighting controls will match the lighting for a given activity and a given area. Lighting in the room needs to be set in different zones. A multi-scene control system here is a plus.





Dining Room

Rules of Thumb

- 1. Accent lighting over the table area needs to be kept within the perimeter of the table. Recessed downlights over the chair area can cause unpleasant shadows on faces and will also radiate unnecessary heat to the person seated below.
- 2. Chandeliers should be proportioned to the size of the table no larger than 12" less the diameter of the table. The bottom should be about 36" above the table.
- 3. When there is no downlight on the chandelier, use two accent recessed downlight units to enhance the table setting and centerpiece. These units must be spaced to avoid casting shadows. Be careful of reflections from glass table tops.
- 4. There should be plenty of shadow-free lighting in the serving and carving areas. Lighting here can come from the wall or overhead.



• Ask an Expert

Room Lighting Techniques

Dining Room

Chandeliers - How High Above the Table?

 Suspend fixtures high enough to see one another across the table — 30" above the table on an 8' ceiling, and add 3" for every additional foot of ceiling height.



Bedroom

 The lighting in the bedroom must make the room beautiful and functional for a number of uses. Bedrooms are not just for sleeping; many read in bed, watch television, and dress for the day. The focal point is the bed, but dressers, nightstands, and mirror areas need to be illuminated. Suggested levels are 5 - 10 footcandles for general lighting.



Bedroom

- When setting up lighting for reading, make sure that the sleeping partner is not disturbed by the one reading. Illuminance should be 30 - 50 footcandles for reading in bed.
- Many of today's bedrooms use paddle fans to enhance both heating and cooling. Recessed lighting design needs to take the blade movement into account to prevent light strobe on the area below.





Office or Study

 Today, many people work at home. Here, we see two very different tasks being performed: paper tasks and computer tasks. These two pose different lighting problems. Computer screens are self-illuminated, and with external light, contrast is reduced and seeing is more difficult. Working under these conditions results in fatigue.





Office or Study

- General lighting in this space should bring balance to the brightness in the field of view. This can be done by a central ceiling fixture or a floor lamp. When working with high gloss paper, illumination should come from either side to avoid ceiling reflections. This type of reflection reduces contrast between the paper and print which makes it hard to read.
- Task lighting for long periods of reading is best achieved when a ceiling- mounted fluorescent is placed slightly behind or at either side of the desk.



Office or Study

Rules of Thumb

- 1. Avoid bright sources of light illuminating the computer screen, such as windows (they need to be screened), a ceiling fixture, or a nearby lamp shade. Illuminance on the screen should be 10 20 footcandles.
- 2. A task light should be placed to the side rather than the front of the desk. Illuminance here is 20 50 footcandles and 100 footcandles for older eyes.

Summary

The Difference in Lighting Can Help Make a House a Home

• You take great care in planning the fine details of your home's interiors. Selecting the right lighting can illuminate your vision and transform your space from the ordinary to the extraordinary.



Summary

• Whether your are planning to illuminate a new home or a room addition, lighting can make a large difference in the final appearance of the space. Lighting can enhance the quality of one's life.



Conclusion of This Program

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