

# ECE 466: LED Lighting Systems

IN

## Absolutes

- Basic electric AC and DC circuits at Sophomore level or equivalents

## Flexibles

- Junior Level Analog Electronics
- Basic Heat Flow Concepts

## Concepts:

- Photon concepts and the electromagnetic spectrum
- Color versus wave length concepts and color index as a metric of a light source
- Power Electronic Energy sources driving light sources in a compact and efficient manner
- Imbalance between lifetimes of light sources and electronic drives and implications for system design
- CFL and LED Alternatives to soon to be outlawed incandescent lights and their special electronic drive needs
- Engineering circuit and heat flow laws are contrasted to laws of man for allowable lighting pathways as determined by the government

## Applications:

- Indoor and outdoor lighting for both commercial and residential
- Backlights for LCD panels
- Organic LEDs on flexible plastic substrates for advance lighting systems
- Niche applications of LED's and lasers to HD projection displays with increased color spectrum

## Tools:

- Light source and optical Ray tracing commercial programs from the illumination industry

OUT

## Lighting System Requirements

- Incandescent lightings rise and demise via government policy
- Alternative Fluorescent light sources and compact fluorescent lights (CFL) to incandescents
- Alternative LED light sources
- Color index as well as Watts to Lumens efficiency available from all three light sources versus cost
- Power Electronic Drives for CFL and LED light sources to achieve dimmable operation
- Basic heat flow analysis

## Light Commercial and Retail

- Special requirements on efficiency and color index of light sources
- Required Light illumination levels desired spatial illumination profiles
- Role of heat removal from electronic components in light fixtures to achieve long fixture lifetimes
- Recycling of hazardous and toxic electronic and optical components