

## EVDS 639 Architectural Lighting Design

### Abilities

- development of illumination schemes that enhance the underlying design concept (class & project)
- calculate light levels using zonal cavity method (Stein & Reynolds 20.29-20.34)
- simple manual lighting calculations (e.g. determine amount of reflected light flux given illuminance, area, and reflectance for a surface) (class & project)
- application of inverse square law (Stein & Reynolds p. 925)
- application of isolux charts, illuminance cone charts (Stein & Reynolds p. 1121-1122)
- calculation of lighting power density (class & project)
- daylighting design-analysis process (class & project)
- Waldram's method: approach to assignment of relative illuminances (class & project)

### Knowledge

- Waldram's method for calculation of light levels (class)
- *visible spectrum* (Stein & Reynolds p. 912)
- *transmittance* and *reflectance* (Stein & Reynolds p. 912-913)
- *diffuse* and *specular* reflectance (Stein & Reynolds p. 914)
- *luminous flux, lumen* (Stein & Reynolds p. 914)
- *illuminance* (Stein & Reynolds p. 916)
- *luminance, exitance, brightness* (Stein & Reynolds p. 917-918)
- *lightness* (class) !note - important concept
- *photopic* and *scotopic* vision (Stein & Reynolds p. 914-916, class)
- *colour correction, cosine correction* (class)
- candlepower distribution curves (Stein & Reynolds p. 926)
- *discomfort glare* (Stein & Reynolds p. 940-946)
- *sparkle* (class)
- *veiling reflections* and *reflected glare* (Stein & Reynolds p. 946-950) [exclude ESI p. 950-954]
- recommended luminance ratios (Stein & Reynolds p. 957-958)
- subjective reactions to lighting (Stein & Reynolds p. 958-960)
- *colour temperature-correlated colour temperature* (Stein & Reynolds p. 961)
- object colour (Stein & Reynolds p. 961-965)
- *efficacy* (Stein & Reynolds p. 966)
- daylighting design considerations (class)
- operation of incandescent filament lamps in general terms (Stein & Reynolds p. 1016-1020)
  - lumen maintenance, lamp life, efficacy range
- filament lamp types - R, PAR, BR, ER, tungsten, tungsten-halogen (Stein & Reynolds p. 1017-1025 & class)
- operation of incandescent filament lamps in general terms (Stein & Reynolds p. 1017-1018)
- lumen maintenance, lamp life, and efficacy ranges in incandescent lamps (Stein & Reynolds p. 1020, 1024, 967)
- fluorescent lamp types - T12, T8 (Stein & Reynolds p. 1026-1032)
- lumen maintenance, lamp life, and efficacy ranges in fluorescent lamps (Stein & Reynolds p. 1032-1037)
- function of ballasts in general terms (Stein & Reynolds p. 1040-1044)
- operation of high intensity discharge lamps in general terms (Stein & Reynolds p. 1045-1050)
  - lumen maintenance, lamp life, efficacy range
- spectral distribution of light sources (Stein & Reynolds p. 1050-1056)
- *colour rendering index* (Stein & Reynolds p. 1056)
- lighting system types (Stein & Reynolds p. 1072-1079)
- luminaire (Stein & Reynolds p. 1086)
- lighting fixture distribution characteristics (Stein & Reynolds p. 1086)
- luminaire light control (Stein & Reynolds p. 1087-1095)

- spacing-to-mounting height ratio (Stein & Reynolds p. 1095-1096)
- luminaire mounting height (Stein & Reynolds p. 1097-1098)
- coefficient of utilization (Stein & Reynolds p. 1101)
- lighting for areas with visual display terminals (Stein & Reynolds p. 1168-1171)
- task-ambient lighting (Stein & Reynolds p. 1176-1177)

### Awareness

- factors in visual acuity (Stein & Reynolds p. 928-936)
- IES illuminance recommendations (Stein & Reynolds p. 936-957)
- scale model techniques for lighting (class, Stein & Reynolds p. 1007-1010)
- HIR lamps (class)
- lighting design procedure according to Stein & Reynolds (p. 1059-1071)
- point source calculation method (p. 1122-1123)
  - concept of *photopic and scotopic* responses to light (light- and dark-adapted vision) (class)
  - concepts of *accommodation, adaptation, glare* (Stein & Reynolds p. 942-950)
  - judgment of brightness differences (class, project)
  - visual field and perception of detail (Stein & Reynolds p. 926-936)
  - the luminous environment: spatial orientation versus central task vision (class)
  - general concept of using light to shape experience (class, project)
    - visual order (class)
- effects of different brightness ratios (class, project)
- factors affecting brightness tolerance (class)
- adaptation and surround brightness (class)
  - concept of *sparkle* (class)
- effect of spectral distribution of source (colour output) on perception of surfaces (class, SAIT lab visit, Stein & Reynolds p. 961-962)
  - concept of *colour temperature* (Stein & Reynolds p. 961)
  - factors affecting task performance - Stein & Reynolds p. 928-936)
  - concept and avoidance of *veiling reflections* (Stein & Reynolds p. 946-950)
- visible transmittance (class)
- functioning of windows as daylighting apertures and as view apertures (class)
- techniques to reduce glare from windows - surround treatment (class)
- daylighting considerations for plants and artworks (in general terms - class)
- light sources: incandescent, fluorescent, high pressure sodium (Flynn: 140-148)
  - form of light (e.g., point versus linear), mechanism of light generation, colour characteristics (spectral distribution), relative cost, efficiency, lamp life,
    - appropriate applications
    - ballast - function
- specular, semispecular and matte (diffuse, lambertian) reflectors
- shielding (Flynn: 156)
- terms: reflectance, luminance, brightness, lightness, exitance
- units: lumens, lux, candela/square metre
- concept of point-by-point estimate (Flynn: 164-165)
- zonal cavity method (Flynn: 166-171)
- *coefficient of utilization* (Flynn: 168)
- classification of electric sources by directionality: direct, indirect, direct-indirect
- intensity distribution curve
- spacing-to-mounting-height ratio
- life-cycle costing (class)
- power, energy, current, voltage, resistance, demand, peak demand, transformer (class)