

## Course Content

<b>Solid State Lighting (Elective II)</b>			
Lecture	Tutorial	Practical	Credit
3	1	3/2	3

	Internal	Final	Total
Theory	20	80	100
Practical	25	-	25

### Course Objective:

To introduce the concept of Solid State Lighting and impart the skills necessary for implementing light emitting diode in various sectors of illumination.

### Course Contents:

- 1. Introduction (2 hours)**
  - 1.1 Historical Introduction,
  - 1.2 Market status and future possibilities.
  - 1.3 Light sources.
- 2 Vision, Photometry and Colorimetry (5 hours)**
  - 2.1 Human vision and relative luminous efficiency function
  - 2.2 Radiometric and photometric units
  - 2.3 CIE color matching function
  - 2.4 CIE chromaticity diagram
  - 2.5 Color property of light and color rendering index
- 3 Basic of Solid State Lighting (6 hours)**
  - 3.1 Electroluminescence and radiant efficiency
  - 3.2 Radiative recombination
  - 3.3 Heterostructure and quantum well
  - 3.4 Semiconductor material system for high brightness LED
  - 3.5 WLED basics, Color mixing
  - 3.6 Phosphor technology and emission spectrum and dichromatic and polychromatic phosphor technology
- 4 Light Extraction from LED (5 hours)**
  - 4.1 LED structure
  - 4.2 Arrangement of escape cone and substrate
  - 4.3 Material system for transparent substrate
  - 4.4 Distributed Bragg reflector
  - 4.5 Shaped and plane-walled chip.
- 5 LED Luminaire Design (4 hours)**
  - 5.1 LED V-I characteristic
  - 5.2 LED ballast
  - 5.3 Closed loop control mechanism for LED and LED luminary design

- 5.4 Power supply design techniques
- 5.5 LED driving integrated circuits
- 6 LED Measurement (5 hours)**
  - 6.1 Optical and electrical characteristic
  - 6.2 Measurement techniques
  - 6.3 Standards (ASSIST, CIE, ANSI and IESNA) for WLED measurement
  - 6.4 Measuring instruments and their significance
  - 6.5 Nepalese LED standard and market review
- 7 Lighting Design (12 hours)**
  - 7.1 Introduction to DialUX
  - 7.2 Indoor lighting design
  - 7.3 Outdoor lighting design
- 8 Application of Solid State Lighting (4 hours)**
  - 8.1 Development status
  - 8.2 Contemporary application
  - 8.3 Application of LED in developed and developing country
  - 8.4 Economic analysis
  - 8.5 Lighting electrical layout planning and implementation
- 9. Introduction to Organic Light Emitting Diode (OLED) (2 hours)**

**References:**

1. Zukauskas, A., M.S. Shur, and R. Gaska. Introduction to Solid State Lighting. New York: Wiley, 2002.
2. Schubert, Fred E. Light Emitting Diodes. 2nd ed. New York: Cambridge University Press, 2006.
3. Csele, Mark. Fundamentals of Light Sources and Lasers. New Jersey: Wiley, 2004.