IES COURSE

FUNDAMENTALS OF LIGHTING

Student Manual

Illuminating ENGINEERING SOCIETY

IES Educational Program

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Master Outline for Fundamentals of Lighting

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PART 1

Module 1: History of light, Professional Practice, Defining Light, Vision, Color, and Light and Health

Learning objectives

Upon completion of this Module you will be able to:

1. Analyze the history of light and the role of the lighting designer in the building design process.
2. Describe the physical principles central to the nature of light.
3. Identify the way the human visual system processes light and color, engendering positive emotional and physical responses.
4. Describe important effects of light on human health which promotes physical well-being.

1.0 Introduction

This module provides an overview of the history of light, describes some principles that are central to the nature of light, components of the eye and an overview of the current understanding of how the human visual system light and some basic physics works, important effects of light on human health, and the relationship between light, color and the perception of color by the human visual system.

2.0 A Brief History of Light and Lighting

~20,000BC to 1800AD The first evidence of the use of flame in lamps has been dated to approximately 20,000BC. From that time until the opening decade in the 1800's, the open flame was the sole technology employed for human-made light (see DiLaura, A History of Light and Lighting).

- First as fire, then torches, then oil lamps followed by candles.
- The main components of a simple oil lamp: wick and oil reservoir.
- The earliest lamps were nothing more than a stone with a bowl shaped depression or seashell, containing some type of oil or animal fat that moistened a wad of dried moss or other dry, absorbent plant matter that acted as a wick.
- The porous wick would draw up oil via capillary action while it burned, which also kept the wick from being consumed too rapidly. Lamps provided a somewhat more controlled and slow burning flame than a torch, and could be kept burning not only for light but in order to light larger fires for cooking or warmth.
- When humans had started to create pottery, circa 30,00BC, oil lamps became more elaborate, with enclosed reservoirs and defined places to insert the wick. But the operation was much the same: the reservoir would be filled with fuel, the wick inserted and allowed to draw up fuel, and the lamp lighted from another lamp or fire already burning.
- Wicks typically consisted of bound reeds or fibrous straw. One can readily imagine early lighting engineers experimenting with different wick materials, fuels, pottery reservoir materials and lamp designs.