**ARCH 244-BUILDING SCIENCES II COURSE OUTLINE**

1. **ACOUSTICS & NOISE CONTROL**

**WEEK 1: WHAT IS SOUND?**

* Sound waves
* Magnitude of sound
* Frequency and bands
* Some Important parameters
* An example: Echo vs. Reverberation Time

**WEEK 2: 5 IMPORTANT SOUND PHENOMENON**

* Absorption
* Transmission
* Reflection
* Refraction
* Diffusion

**WEEK 3: HOW DOES SOUND TRAVEL?**

* Propagation of waves
* Air-borne Sound
* Structure-borne sound
* Impact noise
* Direct and reverberant sound fields

**WEEK 4: HOW CAN WE HEAR?**

* Ear as an hearing instrument
* Do we hear what we see?
* Perception vs. noise annoyance
* How to measure hearing?
* Establishing acoustic comfort

**WEEK 5: ANALYSING ARCHITECTURAL ACOUSTICS**

* Ancient times
* Acoustical vs. non-acoustical spaces
* Measuring air-borne, structure-borne, and impact sound
* Easy way: Computer modeling
* Objective measurements vs. subjective perception

**WEEK 6: HOW TO DESIGN BETTER ACOUSTIC SPACES?**

* Enhancing an acoustical space
* Avoiding a noisy environment
* Some useful materials
* Interesting approaches on auditory perception
* The guidelines and regulations to follow while designing

**WEEK 7: MIDTERM I (ACOUSTICS)**

**B) VISUAL COMFORT, NATURAL AND ARTIFICIAL LIGHTING**

**WEEK 8:**

**ARTIFICIAL LIGHTING - PHYSICS OF LIGHT**

* Electromagnetic Spectrum
* Properties of a Light Wave
  + Wavelength
  + Amplitude
  + Frequency
  + Energy
* Electromagnetic Radiation
  + Ultraviolet Radiation
  + Infrared Radiation
* Optical Control
  + Reflection
  + Refraction
  + Diffraction
  + Interference
  + Transmission
  + Diffusion
  + Absorption
  + Efficacy of Light Sources
  + Luminance
  + Illuminance

**VISION AND PERCEPTION**

* The Process of Visual Perception and the Visual Field
* Day and Night Vision
* Adaptation and Accomodation
* Visual Performance
* Glare
  + Direct Glare
  + Reflected Glare
* Vision and Age

**WEEK 9: COLOR SPECTRUM AND COLOR PERCEPTION**

* Color of Objects
* Color of Light Source
  + Spectral Power Distribution (SPD)
  + Color Rendering
  + Color Temperature (CT)
  + Correlated Color Temperature (CCT)
  + Color Rendering Index (CRI)

**WEEK 10: LIGHT AND FORM - LIGHTING APPLICATIONS**

* Light Distribution Strategies
  + General Lighting (Direct/Indirect-Ambient)
  + Task Lighting
  + Accent Lighting
* Highlighting Free Standing 3-D Objects
* Shadows
* Silhouetting
* Wall Washing
* Wall Grazing
* Uplighting & Downlighting
* Luminous Wall Panel
* Cove/Coffer

**WEEK 11: ARTIFICIAL LIGHT SOURCES**

* Luminaire Performance
* Control of Light
  + Reflectors
* Family Tree of Electric Lamps
  + Incandescent
    - Standard Voltage
    - Low Voltage
  + Discharge
    - Fluorescent
    - High Intensity Discharge (HID)
  + LED-OLED
* Fiber Optics
* Lighting Control Strategies
  + Building Automation Systems (BAS)

**WEEK 12: HOLIDAY**

**WEEK 13:**

**NATURAL LIGHTING – FACTORS AFFECTING DAYLIGHT, ORIENTATION**

* Types of Natural Light
* Topography/Urban Design
* Orientation
* Form of Building
* Surfaces
* Control of Glare

**DAYLIGHT APPICATION ELEMENTS**

* Light Well
* Atrium
* Skylight
* Clerestory
* Roof Monitor
* Sawtooth
* Light Shelf
* Louvers
* Sloped Ceiling
* Light Pipe
* Heliostat
* Mirror Shaft
* Glazings

**WEEK 14: MIDTERM II (LIGHTING)**