

Unit	ARCH 0003	
Unit Title	Building Environment 1	
Aims.	To introduce the basic concepts of Building Environmental Engineering and to apply them to the design of buildings using passive means of environmental control.	
Objectives	To provide a basic vocabulary which enables a discussion of environmental issues. To make students aware of the physical impingements upon the body. To introduce the principal variables in the design of the physical environment. To use calculations at a basic level sufficient to enable students to make informed decisions about the orientation of buildings, the choice of building envelope and satisfactory internal conditions.	
Content	Human response	Physical variables, stimulus, sensation, comfort, perception, adaptation, contrast.
	Climate	Global,macro,meso,micro,building,variables, sunshine, irradiance, humidity, rainfall, windiness, wind direction, maximum temperature, minimum temperature, average temperatures, diurnal temperatures, solar spectrum, latitude, longitude, declination, tilt and the seasons.
	Vernacular buildings	Response to thermal conditions, building forms, hot dry climates, hot humid climates, cold climates etc., wind catchers, available materials.
	Thermal environment	Radiation, convection, conduction, psychrometrics.
	Thermal comfort	Physiology, metabolism, comfort indexes, equivalent temperature, environmental temperature, radiant temperature.
	Heat losses	Calculation of U-values, regulations, degree-days, ventilation losses,.
	Heat gains	Simple calculation of incident irradiance, direct sunlight, diffuse radiation, ground reflected radiation, effect of reveals, thermal mass, properties of glass .
	Condensation risk	Calculation of vapour transmission, position of thermal insulation.
	Building examples	Shape, lightweight, heavyweight, transparent, solid.
	Natural lighting	Importance as a formgiver, light climate, design guides
	Units of light	lumens, illuminance, luminous exitance, .
	Sunlighting	Sun dials, sunpath diagrams, position of sun, altitude, azimuth, solar wall azimuth.
	Daylighting	Daylight factors, measurement of daylight factors, calculation of average DF, daylight schedule.
	Sound environment	Experience of sound and its measurement, frequency and musical pitch, amplitude and sound intensity, decibels and sound levels, adding sound levels.
	Sound propagation	In free space, distance, barriers, planning.
	Sound insulation	Transmission, absorption, reflection, mass effects, frequency effects, sound reduction index, effects of small gaps.
	Sound in rooms	Reverberation time, privacy, nuisance, calculation of reverberation time, times for music and speech.