

Unit	ARCH 0004	
Unit Title	Building Environment 2	
Aims	To introduce the range of Building Services incorporated within buildings. To show how they may be used to actively control the internal building environment in contrast to the passive means considered in Building Environment 1.	
Objectives	To show how the choice of particular systems may be influenced by the type of architectural and engineering solution chosen for the building. To provide a framework for establishing the design objectives for the internal environment and to demonstrate the application of principles by examining examples of systems in houses and small commercial buildings.	
Content	Building services	Range of services within buildings, electricity, telephones, hot and cold water, drainage, refuse, fire control, gas, mechanical ventilation, heating, cooling, lighting.
	Need and development	History, provision of comfort, energy, safety, sick building syndrome, individual control.
	Systems design	Characteristics of systems, design checklist, supply and demand, installed demand, simultaneous demand, distribution method, quality, control, safety, installation, maintenance, extendibility, dismantling.
	Thermal environment	Fresh air, oxygen, dilution, odours, air temperature, humidity, radiant temperature, air movement, air mixing, draughts, displacement ventilation, air change rate determined by ventilation needs or thermal capacity, temperature differences between input air and room.
	Heating systems	Wet radiator systems, pipework, radiator valves, temperature compensation, thermostatic radiator valves.
	Mechanical ventilation	Kitchen and bathroom ventilation, heat recovery, ducted ventilation, diffusers and grilles.
	Air conditioning	Cooling, relative humidity, a/c units, filters, sound absorbers, heating battery, cooling battery, humidifiers, fans, controls.
	Plant	Heating, boilers, high efficiency, condensing, NO <sub>x</sub> refrigeration, cooling towers, chimneys.
	System choice	Central plant, distribution, delivery, space, variety.
	Daylighting	Rules of thumb for daylighting, daylight factor at a point, Waldram Diagram, planning requirements, glazing types, solar shading examples.
	Regular lighting arrays	Physical arrangement, service illuminance
	Design of electric lgt.	Appearance, illuminance ratios, surface reflectances, Flux fraction ratio, direct ratio, lumen method, utilisation factors, maintenance factor.
	Quality	Disability glare, discomfort glare, reflected glare, modelling, vector/scalar ratios, shadows, flow of light.
	Luminaires	Optical performance, reflectance, diffusion, refraction, polarisation, interference, appearance, Light Output Ratios, CIE specification.
	Light sources	Efficacy, life, colour, colour rendering, optical size, physical size, variability, cost, restart capability.
	Acoustics	Sound and noise analysis,
	Propogation of sound	Outside, sound reflection, diffraction and diffusion. Sound absorption. Sound level and reverberation within rooms.
	Trans. and insulation	Single partitions. Sound transmission in and out of buildings. Cavity constructions. Flanking transmission. Impact noise insulation.
	Acoustic design	Speech and music. Sightline design, acoustic faults. Outside and enclosed theatres. Concert hall design including traditional rectangular hall.