**The External Ambient Temperature (˚C)**

The external ambient temperature is calculated by:

T = The external ambient temperature

A = The average of the last digit of the UCD student numbers of all students in the group (excluding any numbers ending in zero).

h = Hour of the day

d = Day of the week

**Thermal Resistance**

The thermal resistance was calculated by measuring the thickness of the material in metres (x) and dividing it by the thermal conductivity (k).

Rt = Thermal resistance (m^2k/W)

X = thickness (m)

k = Thermal conductivity

**Thermal Transmittance (U-value**)

Rt = Thermal resistance of the material

**Heat Transfer Rate**

Heat transfer rate through the wall, window, ceiling and floor:Top of Form

Bottom of Form

U = U-value of the material

Av = room temperature (22˚C)

T = External ambient temperature

**Total Heat Transfer (Heat Flux) (W)**

The total heat transfer through a certain area of material is given by:

q = Total Heat Transfer (Heat Flux)

Heat transfer rate. = Rate of Heat Transfer

A = Area

**Ventilation**

V = Volume of air in room

t = Hour in seconds

**Ventilation Heat Losses**

Heat transfer through ventilation is given by:

* = Heat Transfer

Specific Heat Capacity of Air (1005 )

= Density of Air

= Rate at which air from inside moves outside

**External Surface Temperature**

= Temperature of External Surface

A = Area

= Indoor Heat Coefficient (8.3 (

= Outdoor

Heat Transfer by Convection

**Internal Surface Temperature**

Temperature of Internal Surface

Initial temperature (22˚C)

Heat transfer rate. = Heat Transfer Rate

= Indoor Heat Coefficient (8.3 (

A =Area

**Heating Load (W)**

all materials used in the construction have been regenerated so that their insulating properties have been improved.

**Appendices**

* The lecture notes for this module was used as a source of information and formulae.
* http://www.foe.ie/download/pdf/understanding\_the\_targets\_in\_the\_climate\_bill\_compared\_to\_irelands\_eu\_obligations\_jan\_2011.pdf