

1 PREAMBLE

This module introduces basic concepts and general issues related to the design of environmental conditions within buildings. In particular, it considers ways of manipulating the physical environment in order to make occupants comfortable without wasting energy. The course concentrates almost exclusively on '**Passive Buildings**' – these are buildings where the building itself is designed to modify the external climate.

If you apply yourself, then at the end of this unit you will be able to:

- Analyse a site's physical characteristics,
- Assess the impact of physical climate upon building design,
- Use the building form and construction to save energy,
- Apply comfort and 'experience' as a criterion of design,
- Calculate heat losses and estimate solar gains,
- Calculate daylight factors and assess window designs,
- Assess the basic acoustics of a room.

1.1 Relation of this unit to the whole course

This unit is only a part of your course this Semester. Indeed, in relation to the whole course, the time and credits awarded for completion of this unit on environment might seem quite small. However, this should not be seen as an indication of the importance of this subject. It might be suggested that the most important factor in the design of a building is its structural integrity because without that the building might collapse and kill people. But I would suggest that there are no more important drivers for the design of buildings than that they provide healthy accommodation and limit their impact on the global environment.

You will find that throughout your course you will be expected to be acquainted with the material covered in this unit. You will find that when you practice engineering or architecture you will be using continually the ideas and concepts introduced in this unit.

1.2 Unit materials

There are a set of notes in PDF format that can be accessed through Moodle. These consist of introductions to subject areas, information about the design of buildings and explanations of ideas. There are questions at the end of each chapter and also suggested tasks or projects that you can undertake, either as individuals or as groups.

There are model answers to the questions, though these might be time locked so that they can only be accessed a week or two after the question sheets have been presented. There will also be on-line quizzes and those slides shown during lectures that are not included in the printed notes.

I will lecture for two periods each week as indicated in the timetable and give one class tutorial. The lectures and electronic notes are not identical. During lectures I will respond as seems appropriate and it might well be that I do not cover all the material in the electronic notes.

1.3 Methods of study

There are many different approaches to study and you should seek a method that suits you best. In this unit I will present you with material during lectures and I will work through examples in the tutorial sessions. The tutorial periods are less formal and it is perhaps easier for you to ask me questions during those sessions. Indeed, I would encourage discussion in those periods.

You have a set of printed notes and information in various other forms accessible through Moodle. Discover for yourself which form of material suits you best and then use that form where you can.

We are all different and learn in different ways. However, the results from research indicate that there are particular ways of learning that are appropriate to particular types of individuals.

Learning style		Characteristics
Perception	Sensory	Respond to the outside world – sights, sounds and sensations
	Intuitive	Prefer to internalise – imagine possibilities, have insights and hunches
Input	Visual	Appreciate better a visual representation – diagrams and pictures
	Verbal	Accept ideas and concepts through language
Organisation	Inductive	Observe phenomena and from facts infer general principles
	Deductive	Given a set of rules deduce what will happen
Processing	Active	Prefer to exercise mind through discussion or act out ideas
	Reflective	Rather a passive observer, watch and introspect and reflect upon the world
Understanding	Sequential	Prefer to go in steps, one at a time, be careful of the trees
	Global	Make large jumps, need to see the whole big picture to understand – (holistic)

Table 1 – Different styles of learning after Richard M Felder(1988)

I have attempted to provide a variety of material that might allow you to approach the subject in various ways. This means that you should not attempt to do everything that is suggested in the notes and on the Moodle site. Choose material that suits you and do those types of exercise that you find most rewarding.

In studies of student performance it has been found that the main factor determining success is the time a student spends on a subject. Spend time in going through notes that have been given to you and make brief notes of your own when you wish to put ideas into your own conceptual framework.

First, guard against thinking that you fully understand something just because you have followed a written or spoken argument. More often than not this is not really so, and usually you need to actively work with the material before you fully comprehend it. If you tend to work globally, it even might be that you do not understand an important issue until you have covered much material that has seemed incomprehensible. Then it suddenly clicks once a vital part of the jigsaw puzzle has been laid out on the table.

Secondly, guard against postponing that which would best be done immediately. This takes many guises, but one example is copying of references to read at a later time. More often than not, you would be better to read the article immediately and then make notes. The notes should then be used for later reference.

If information is not immediately comprehended it does not necessarily mean that it is beyond your understanding. For most of us, time and effort are required if we are to gain real insights. Perhaps it might be that you need to actively discuss a problem with someone before you are able to sort an idea out in your head. Try working out an issue in a number of different ways in order to help yourself understand how you best learn.

With regard to the time that should be spent on study, I have planned the unit on the basis that you will spend between one and two hours of individual study for each hour of lecture given by myself. If you have a persistent problem then you should try to get help from fellow students and if you continue to be baffled then ask at a tutorial session – there are sure to be others with similar difficulties.

A short comment about equations might prove helpful. Equations are not generally there to be learnt parrot fashion. They express relationships in an economical way; they are a form of shorthand. Generally, they will be rather simple, but unless you appreciate the underlying relationships they express, there is little point in you trying to learn them by heart. In trying to appreciate those underlying relationships it does sometimes help if you undertake a number of examples involving the equations, such as the questions included in the notes.

Some units are more engaging than others, and there may be a temptation for you to concentrate on those, or perhaps you might be persuaded to spend more time on units that a particular lecturer emphasises as being most important. You need to guard against devoting too much of your time to one or two courses. Monitor the time you spend on different parts of the course. Excessive concentration on one unit may be the result of you shying away from tackling some difficult aspect of another unit.

1.4 Reading material

You will be able to complete the course successfully using only the notes provided. However, my style of writing may not suit you and another angle on a topic is always of help in overcoming difficulties. The following books will prove useful as general texts over the next two years:

A different angle on some technical issues:

Introduction to Architectural Science: Steven V Szokolay
 Environmental Science in Building: Randall McMullan,
 Environment and Services: Peter Burberry,
 Environmental Design: Ed. by Randall Thomas.

Outlines of design issues:

The Environmental Tradition: Dean Hawkes
 Manual of Tropical Housing and Building: Koenigsberger et al
 Energy Conscious Design: Ed. Goulding, Lewis & Steemers
 The Climatic Dwelling: Cofaigh, Olley & Lewis