MSc Intelligent Buildings

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Faculty of Science	Programme length: Minimum of 24 months and normally maximum of 60 months part time (12 months full time by agreement)
For students entering in 2003	Date of specification: 17 May 2002

Programme Director: Professor D. J. Clements-Croome
Board of Studies: Construction Management and Engineering Framework Board
Accreditation: Not applicable

Summary of programme aims

One generally accepted definition of intelligent building is:

> *An intelligent building is a dynamic and responsive architecture that provides every occupant with productive, cost effective and environmentally approved conditions through a continuous interaction among its four basic elements: places (fabrics; structure; facilities): process (automation; control; systems): people (services; users) and management (design; construction; performance) and the inter-relationship between them.*

It can be concluded that an intelligent building creates an environment that allows organisations to achieve their business objectives and maximise the effectiveness of its occupants, while allowing efficient management of resources with a minimum lifetime cost. The modules for the course reflect this idea.

The principal aim of the programme is to provide advanced knowledge and understanding about intelligent buildings and hence educate those who will commission, design and operate such buildings. It will include building owners and developers, architects, scientists, engineers and facilities managers, who already work in the construction and property industry, or those who are considering entering the construction industry and who have had other industrial experience. The programme also aims to:

- import a holistic interdisciplinary approach to design and management process;
- describe the latest technologies and also how changing social outlooks are affecting building design;
- engender a sustainable approach to building design and management.

Transferable skills

The University's Strategy for Teaching and Learning has identified a number of generic transferable skills, which all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to enhance their skills relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team working and use of information technology.

The programme will develop the following transferable skills:

- The ability to negotiate and communicate orally and in writing
- The capacity to deal with multi- criteria decision-making
- The ability to work in a team

Programme content

Core Modules:

			Credits	Level
Module 1	CEMIB1	Concept, Strategy and Management	20	M
Module 2	CEMIB2	Building Systems, Architecture and People	20	M
Module 3	CEMIB3	Information Technology and Communication Systems	20	M
Module 4	CEMIB4	Engineering Intelligence into Buildings	20	M
Module 5	CEMIB5	Financial Analysis and Investment Appraisal	20	M

Elective Modules:

			Credits	Level
Module 6	CEMIB6	Facilities Management	10	M
Module 7	CEMIB7	Design Management and Briefing	10	M
Module 8	CEMIB8	Principles of Project Management	10	M
Module 9	CEMIB9	Sustainable Design, Construction and Operation	10	M
		Dissertation	50	M

Part-time/Modular arrangements

Modules will be provided in 3 to 5 days attendance periods at the University.

Progression requirements

Masters Award

To obtain the Masters Award a student must obtain 180 credits consisting of the five compulsory core modules, three elective modules and the dissertation. In the usual part-time pattern, there will be no formal interim progression stages. In this usual pattern a student will commence the dissertation module at the beginning of the second year when five modules will have been successfully completed. Failure to complete the Masters award may allow the award of a Certificate or Diploma on the basis stipulated for these awards below.

Diploma Award

To obtain the Diploma Award a student must obtain 120 credits including at least three compulsory core modules.

Certificate Award

To obtain the Certificate Award a student must obtain 60 credits consisting of three compulsory core modules.

Note: A module cannot be credited for more than one award.

Summary of teaching and assessment

The full detail of teaching and assessment in each module is given in the module descriptions.

Teaching

The general approach is to deliver lectures, seminars, workshops and site-visits during study at the University, usually one-week module duration per module suited to the part-time mode of studying. This attendance period is supported with guided study through private study and web-based learning.

Assessment

The general assessment pattern for each module is by examination and coursework assignments.

The overall grade for the programme will be the aggregate of modules passed weighted by credit value and classified as below.

The programme will use the University's classification scheme:

Mark	Interpretation
70 – 100%	Distinction
60 – 69%	Merit
50 – 59%	Good standard (Pass)

Failing categories:

40 – 49%	Work below threshold standard
0 – 39%	Unsatisfactory Work

For Masters Degrees

To pass the MSc students must gain an average mark of 50 or more overall including a mark of 50 or more for the dissertation *and have no mark below 40 in core modules.* In addition the total credit value of all modules marked below 40 must not exceed 30 credits and for all modules marked below 50 must be less than 60 credits.*

Students who gain an average mark of 70 or more overall including a mark of 70 or more for the dissertation and have no mark below 40 will be eligible for a Distinction. Those gaining an average mark of 60 or more overall including a mark of 60 or more for the dissertation and have no mark below 40 will be awarded eligible for a Merit.

For PG Diplomas

To pass the Postgraduate Diploma students must gain an average mark of 50 or more *and have no mark below 40 in core modules agreed in modules.* In addition the total credit

value of all modules marked below 40 must not exceed 30 credits and for all modules marked below 50 must be less than 60 credits.*

Students who gain an average mark of 70 or more and have no mark below 40 will be eligible for the award of a Distinction. Those gaining an average mark of 60 or more and have no mark below 40 will be awarded eligible for a Merit.

Admission requirements

Entrants to this programme are normally required to have obtained:

- First degree in a relevant area.
- Experience and qualifications relevant to the course.

Support for students and their learning

University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses the Student Access to Independent Learning (S@IL) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Programme Directors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

Career prospects

The specific aim is to develop ideas and new ways of thinking about smart and intelligent buildings. These arise from the students being exposed to theory, research and methods of critical evaluation, bringing their work-based skills to bear in applying the lessons to their career environment. This will equip students who successfully complete the programme to:

- operate with increased authority within the area of core expertise
- manage others in a team environment
- obtain promotion within or outside their organisation of employment

Opportunities for study abroad or for placements

At present there are no requirements for a period abroad. This is a reflection of the part-time nature of study, although there have been a number of students from other countries who have studied on Masters Programme within the Framework of Modules, to which this Programme belongs, full-time. Opportunities will arise in the future.

Educational aims of the programme

This Master degree aims to develop in students a capacity for the strategic design and management of buildings. The students, on completion of the programme, should be

capable of demonstrating a much broader view on:

- the implications of management decisions extending well beyond building issues;
- the possibilities for improving the performance of organisations through improved environmental effectiveness.

The purpose of the learning experience is to familiarise the students with the full range of issues encountered in hybrid disciplines relevant to intelligent buildings and provide them with the necessary skills to deal with these issues. Part of this learning experience will be based on case studies that serve to reinforce concepts introduced in the programme.

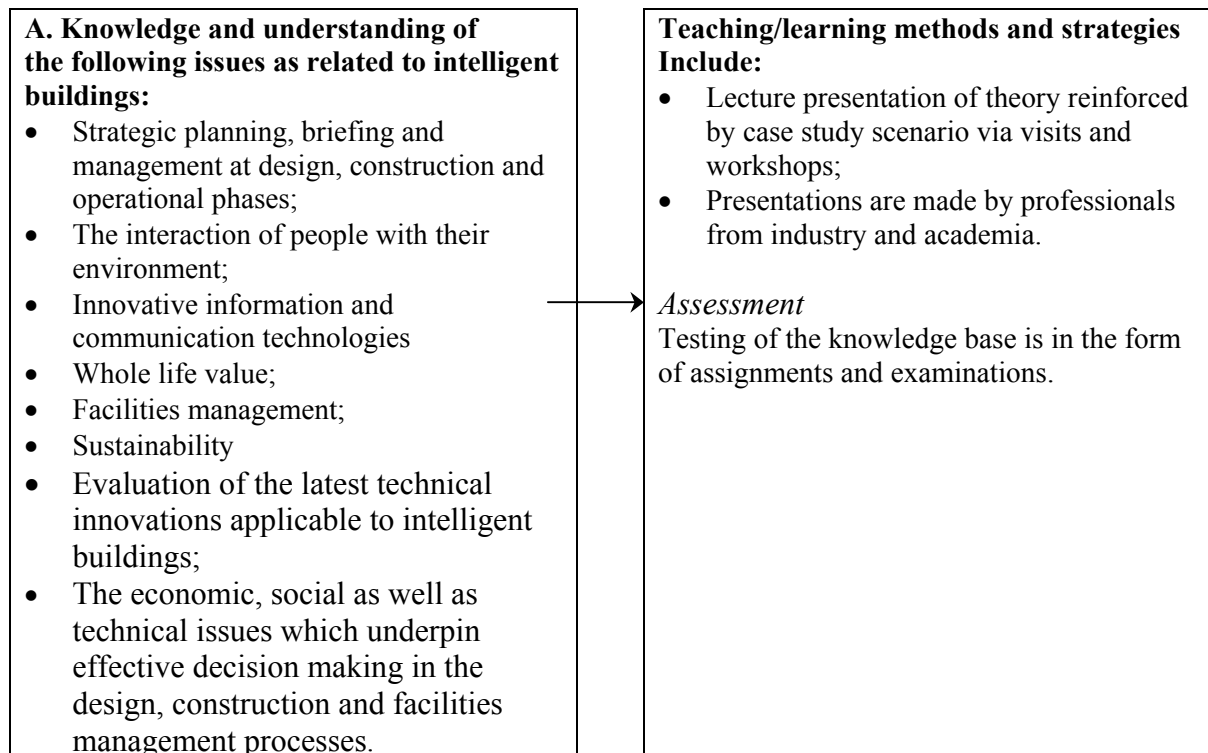In setting the principal objectives for the course it is intended that the delegates will:

- be able to use a holistic interdisciplinary approach in their work;
- recognise that intelligent buildings are responsive to human needs; consume minimum energy, conserve water , employ the principles of waste management; and are non-polluting;
- be able to manage the rapid rates of change, which impinge on activities of their companies;

Delegates who attend the course will have the opportunity to study the nature of intelligent buildings with respect to design, construction and the operation processes from which they are derived. The construction industry is very fragmented at all levels. This course offers opportunity for professionals to study and work together irrespective of their discipline.

Programme Outcomes

Specific outcomes are shown below which in summation meet the general outcomes described above.

Knowledge and Understanding

A. Knowledge and understanding of the following issues as related to intelligent buildings:	Teaching/learning methods and strategies Include:
- Strategic planning, briefing and management at design, construction and operational phases; - The interaction of people with their environment; - Innovative information and communication technologies - Whole life value; - Facilities management; - Sustainability - Evaluation of the latest technical innovations applicable to intelligent buildings; - The economic, social as well as technical issues which underpin effective decision making in the design, construction and facilities management processes.	- Lecture presentation of theory reinforced by case study scenario via visits and workshops; - Presentations are made by professionals from industry and academia. *Assessment* Testing of the knowledge base is in the form of assignments and examinations.

Skills and other attributes

B. Intellectual skills – able to:
- analyse the strategic implications of change as it affects the design of intelligent buildings;
- formulate the whole life approach to decision making;
- generate holistic solutions via impact analysis and synthesis
- critically assess the balance between the high and the low energy;
- synthesise multiple sources of information in order to client requirements;
- defend decision such as product selection on the basis of whole life value;.

Teaching/learning methods and strategies
Strategic thinking is communicated through discussion groups, illustrating the difference between efficiency and effectiveness of alternative solutions.
The students come from architecture, engineering and management backgrounds this ensures a rich interdisciplinary environment.

Assessment
Assignments and dissertation will enable the students demonstrate these skills.

C. Practical skills – able to:
- liaise on a strategic level with organisations;
- undertake sustainability programmes;
- produce workplace design;
- use whole life cost models;
- write briefs describing occupants needs;
- evaluate management and business needs for an organisation;
- organise large-scale organisational change.

Teaching/learning methods and strategies
Students will be encouraged to 'follow through' all of the concepts introduced in the modules by application to their own organisation. Students will be encouraged to lead discussions on particular areas.

Assessment
Assignments and dissertation will enable the students demonstrate these skills

D. Transferable skills – able to:
- work under a time constraint with a team to prepare solutions to a problem;
- Make effective and convincing presentations to clients concerning buildings solutions;
- Assess the relevance and importance of other people's contributions to a group project;
- Be able to undertake an interdisciplinary group project.

Teaching/learning methods and strategies
These will include workshops and seminar presentations.

Assessment
The quality of communication, both verbal and written is fundamental parts of the assessment criteria. They will be assessed both informally (providing the students with ongoing feedback of progress) and formally via assignment and dissertation.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably expect to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the programme handbook.