FACULTY OF ENGINEERING SCIENCE AND THE BUILT ENVIRONMENT

Unit title:	Design and Construction 1	
Unit number:	BCE/2/110	
Unit value:	1.0	
Unit co-ordinator:	P J Mellow	
Contact time:	Lectures	39 hours
	Tutorials	26 hours
Private study time:	85 hours	
Unit pre-requisites:	BCE/1/118 and BCE/1/119 or equivalent	

SHORT DESCRIPTION

This unit brings together all the elements of civil engineering required to create an industrial development. It introduces the student to their interdependence with other disciplines and the legal framework for planning and building. The problems of building on derelict land (Brownfield sites) are determined including environmental impact and policy, and the risks associated with any scheme are assessed, as well as the engineer's duty to design out risks (CDM). A client's brief is taken as the basis for the lectures and coursework in which students work in groups to a formal programme.

AIMS

- To develop students' working knowledge of construction technology as applied to the fields of engineering infrastructure and building structures
- To integrate the design function and process in relation to taught units in the core subjects .
- To develop qualitative skills in connection with construction, planning and feasibility studies.
- To develop student's skills in the communication of construction design ideas.
- To engage students in team working interaction through group work projects and thus develop social and interpersonal skills, leadership and commitment.
- To provide a practical context for environmental and safety issues
- To inculcate thinking of the CDM Regulations into student's every design process

LEARNING OUTCOMES

- The student is expected to become aware of a wide range of current construction terms and methods used in the construction of the principal elements of a civil engineering project.
- The student should become aware of the complexity of construction projects and therefore the importance of problem solving by reduction
- The student is expected to organise workload within a design team
- The student is expected to recognise the importance of simplification in feasibility studies
- The student will be aware of the range of environmental policy issues
- The student will be aware of the engineer's responsibilities in respect of safety and be able to explain the role of the designer and contractor in the CDM Framework
- An ability to communicate design ideas by using annotated drawings is to be fostered
- The use of Codes of Practice and the awareness of risk sources
- Students will be able to provide reasoning and arguments to justify design solutions
- Students will be able to design simple steel buildings and detail their connections
- Appreciate overall structural stability of braced and sway frames

TRANSFERABLE SKILLS

- BECOME MORE AWARE OF THEIR RESPONSIBILTY FOR THEIR OWN LEARNING
- DEVELOP THE ABILITY TO SYNTHESISE AND TEST SOLUTIONS AGAINST GIVEN CRITERIA
- BECOME MORE COMFORTABLE WHEN WORKING WITHIN A TEAM,
- GAIN ABILITY TO PLAN AND TRACK PROGRESS
- DEVELOP PATIENCE AND THE NEED TO LISTEN TO AND INTERPRET CLIENT NEEDS
- ABILITY TO UTILISE ENGINEERING SCIENCE IN SOLVING PROBLEMS
- WORK INDEPENDANTLY WITHIN A GROUP TIMESCALE

TEACHING AND LEARNING PATTERN

Lectures by experienced engineers with appropriate handouts and group seminars intended to encourage discussion, peer review and the development of possible solutions for the feasibility study which forms the major part of the group submission. Workshop sessions with individual drawing station feedback on a developed steelwork design.

INDICATIVE CONTENT

The following topics will be addressed by the Unit:

- design team co-ordination and organisation
- site appraisal, environmental damage
- planning, sustainability
- construction in difficult ground, foundations
- remediation works
- highway design
- drainage design
- the construction of a range of building structures
- stability and loadings on buildings
- the codes for design and erection of steelwork
- beams, columns, simple connections in steelwork
- single storey steel frames
- health and safety during construction

ASSESSMENT METHOD

Continuous Assessment

Groups will present a series of five coursework submissions leading to the portfolio presentation of a completed group design package which will be re-assessed (60%), plus an individual submission of a steel building design (40%).

The group mark may be redistributed by reference to group programmes and minutes in consultation with the unit tutors.

INDICATIVE SOURCES

Core

Anon. Manual for the Design of Steelwork Buildings Structures. IStructE/ICE 1990.

Extracts from British Standards for Students of Structural Design, 3rd Edn. BSI ***

Background

Arya, Ch. (2002). "Design of Structural Elements", Chapman and Hall.

McKenzie, W (2004). "Design of Structural Elements", Palgrave

Anon. Steel Design Guide to BS5950: Part 1 Vol 1, Publn No 202. Steel Construction Institute 1996.

Local Government Management Board, Environmental Practice in Local Government, LGMB, Luton, 1992

Inst. Highways and Transportation., Road & Traffic in Urban Area, HMSO, 1987.

Cavies, K, Tomasin, K, Construction Safety Handbook, Thomas Telford, 1996

Ascott, P., An Employer's Guide to Health & Safety Management, Kogan Page, 1980.

Standing Tech. Committee on Sewers & Water Maintenance, Design and Analysis of Urban Storm Drainage; The Wallingford Procedure: Vol.1, N.W.C. 1983.

Wilkinson, H.W., Pipes, Mains, Cables and Sewers., Oyez Longman, 1984, 143p.

White, J.B., Wastewater Engineering, Edward Arnold, 1987, 330p.

Davis, L., Guide to the Building Regulations 1991 for England and Wales, Butterworth, 1992, 361p.

Hodgkinson, A., Foundation Design, Architectural Press, 1986, 127p.

Thompson, J.R., Engineering Safety Assessment - Introduction, Longman 1987.

Tomlinson, M.J., Foundation Design and Construction, 5th Edition, Longman, 1986, 842p.

Hodkinson, A., Architects Journal, AJ Book of Building Structure, Architectural Press 1980.

Stround-Foster, J, Mitchell's Building, Series Pt.1, Structure and Fabric, B.T. Batford, 1991.

Barry, R., The Construction of Buildings: Vols 1 to 5, PSB Professional, 1989.

Anon, Manual for Estate Roads, Vols 1 and 2, Kent County Council (or similar) 1986. Anon, Single Storey Steel Framed Buildings - a design guide for students, British Steel, 1987 Monaghan, E.J. Construction of Fills, Wiley 2nd ed 1994.

Blowers A, Planning for a Sustainable Environment, Earthsca, London, 1993

Charles, J.A. Building on Fill: Geotechnical Aspects, BRE 1993.

Barnbrook, House Foundations, BCA 1981.

Optional

British Standards Institute. Structural Uses of steelwork in buildings. BS 5990 : Part 1 Structural Steel Sections. Steel Construction Industry 1992 Steelwork Design Guide to Eurocode 3 Part 1.1–Introducing Eurocode 3 (3rdEdition)SCI1999 QSE, CSC Fastrack and SAND Computer Manuals

Civil Engineering Construction, Design and Management. Dene R Warren, Macmillan 1996