FACULTY OF ENGINEERING SCIENCE AND THE BUILT ENVIRONMENT

Unit title	Design and Construction 2
Unit number	BCE/2/114
Unit value	1.0
Unit co-ordinator	P J Mellow
Contact time	Lectures 30 hours
	Tutorials 15 hours
Field Trip	35 hours
Private study time	50 hours
Group work time	20 hours
Unit pre-requisites	BCE/2/110 or equivalent

SHORT DESCRIPTION

This unit develops Design and Construction 1 further to include the design of the concrete elements and structures to complete the design for an industrial and commercial development. It uses the brief to produce a design statement and develop this into design options for concrete structures incorporating foundation options, bridges and tunnelling. Recycling of materials, whole life costing, and sick buildings are covered and the safety of building work during construction, including CDM Regulations, are revisited.

AIMS

- To introduce students to the design of concrete structures.
- To develop qualitative skills in the presentation of structural options
- To develop students' abilities in the presentation of information in digital format

LEARNING OUTCOMES

The student should be able to:

- interpret rules from codes of practice into design
- recognise load paths and take down structural loading
- students will be able to design simple reinforced concrete elements
- detail simple reinforced concrete elements
- communicate design ideas by using annotated drawings and digital representation is to be fostered
- use computer programmes to design elements and understand their limitations
- Students will have knowledge of whole life costing of buildings

TRANSFERABLE SKILLS

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TEACHING AND LEARNING PATTERN

Lectures on all topic heads supported by printed handouts, design guides and seminar work. Workshop sessions with individual drawing station feedback on a developed concrete design.

INDICATIVE CONTENT

The following topics will be addressed by the Unit:

- The philosophy of limit state design
- Assessment of structures loads (dead, imposed and wind)

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- The assembly of components
- Concrete element design

beams (simple and flanged) slabs (one way and two way spanning) columns (short and slender)

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- Concrete productionReinforced concrete detailing
- Bridges
- DrugesTunnels
- Sustainable Development

ASSESSMENT METHOD

Assessment - 20% - Group

Groups will present a coursework submission.

Continuous Assessment - 50% - Individual

Students will submit an individual design in RC divided into four weekly sections with a final submission of the portfolio.

Test - 15%

Individual "in-course" test on code usage and design information

Continuous Assessment Industrial Report - 15%

Full-time students will attend and report upon an industrial visit

Part-time students will give a lecturette and submit a supporting report

CONSTRUCTION VISTS

All Level 2 students are required to participate in a week's field course visiting sites and preparing a report thereon. This visit is normally in Holland in liaison with the Hogeschule von Arnhem and Nijmegen. Visits are made to construction sites for sea defences, tunnels, bridges and structures as well as factories manufacturing concrete products.

INDICATIVE SOURCES

Essential

Extracts from British Standards for Students of Structural Design, 3rd Edn. BSI 1*** McKenzie Manual for the Design of RC Structures. IStructE/ICE 1988 Standard Method of Detailing Structural Concrete IStructE/ICE 1989 Joyce, R. The CDM Regulations Explained Thomas Telford 1995

Optional

Arya, Ch. (2002). <u>"Design of Structural Elements"</u>, Chapman and Hall. Kong, FK, and Evans, RH, (1987)" <u>Reinforced and Pre-stressed Concrete</u>", 3rd Edition, McKenzie, W (2004). "<u>Design of Structural Elements</u>", Palgrave Allen, A.H. Reinforced Concrete Design to BS8110 Simply Explained, Spon Higgins, J.B. & Rogers, B.R., Designed and Detailed (BS8110) C&CA 2003 Eurocode 2; Design of Concrete Structures, Part 1. General Rules for Buildings; BSI 1992 RCC 2003, Strand 7, QSE, CSC Fastrack and SAND Computer Manuals

Background

Dept. of Transport, Standard Bridges, BD1983, DEp., 1983, 4p.

Negaw, T.M., Batlell, Jr. Tunnels: Planning, design and construction, Vol.1., Harwood, 1981 288p.

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

Salvadori, M. Why Buildings Stand Up, Norton 1990

Hughes, B.P. Limit State Theory for Reinforced Concrete Design. Pitman 1988 Jacobs, M The Green Economy: Environmentally Sustainable Development and the Politics of the Future, Pluto, London, 1991