
FACULTY OF ENGINEERING SCIENCE AND THE BUILT ENVIRONMENT

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| Unit title: | Computer Aided Structural Design | |
| Unit number: | BCE/M/432 | |
| Unit value: | 1.0 | |
| Unit co-ordinator: | P J Mellow | |
| Contact time: | Lectures | 26 hours |
| | Tutorial/Seminars | 13 hours |
| | IT Sessions | 13 hours |
| Private study time: | 98 hours | |
| Unit pre-requisites: | None | |

SHORT DESCRIPTION

The Unit will cover basic computer packages and their use to enable students to gain confidence and competence in the design and analysis of structure in a variety of materials. Students will model a variety of forms and undertake preliminary hand checks for their results.

AIMS

- To enhance the students knowledge of of structural behaviour
- To relate fundamental concepts to real life problems,
- To develop students ability in in achieving engineering solutions through analysis and synthesis of structural design.
- To provide students with a wider experience of design in a virtual environment allowing them to experiment with various arrangements of support, member sizes and connections.

LEARNING OUTCOMES

The student should be able to:

- Demonstrate a clear understanding of design
- Analyse structures in a variety of ways,
- To model engineering solutions to real structures
- Understand the considerations which have to be made when selecting the form of structure, including the limitations of design methods. To be aware of risk involved with making unwise modelling assumptions and their real effects.

TRANSFERABLE SKILLS

- They will be able to synthesize solutions to real design problems
- They will better understand their responsibility for safety during the design process and have a wider knowledge of risk sources
- Make practical use of commercially available ICT programs and appreciate the need for hand checks.

TEACHING AND LEARNING PATTERN

Lectures by experienced engineers with appropriate handouts and hands-on IT sessions intended to encourage peer support and further self-study, assisted by self tutoring computer assisted learning packages as appropriate.

INDICATIVE CONTENT

The following topics will be addressed by the Unit:

The use of computer packages, Spreadsheets, Finite Element and AutoCad drawing packages

The purpose, limitations and use of STRAND7, SAND, QSE and MATHCAD packages as appropriate

The use of commercial packages such as STAAD and MASTER SERIES for 3-D modelling and frame analysis, and other packages as available during the life of the unit with particular attention to varying parameters.

Specialist design packages for element design, composite beams, rc design and steel connections

ASSESSMENT METHOD

The unit will be continuously assessed by a number of projects undertaken during the progress of the course. Students will prepare at least four designs using a variety of IT programs for elements and frames and supported by hand checks. They will assess their results and produce a critical summary in each case.

INDICATIVE SOURCES

Core

Brown D, Modelling of steel structures for computer analysis, Steel Construction Institute, 1995

MacLeod Analytical Modelling of Structural Elements, Ellis Horwood, 1990

The Institution of Structural Engineers, Guidelines for the use of computers for engineering calculations, IStructE 2002

Background

McKenzie, W, Design of Structural Elements, 2004, Palgrave

Manuals for the various computer packages as appropriate at the time