FACULTY OF ENGINEERING SCIENCE AND THE BUILT ENVIRONMENT

Unit title:	Finite Element Methods	
Unit number:	BCE/M/550	
Unit level:	Μ	
Unit value:	1.0	
Unit co-ordinator:	M. Gunn	
Contact time:	Lectures	30 hours
	Tutorials	8 hours
	Laboratories	8 hours
Private study time:	110 hours	
Total study time:	150 hours	
Unit pre-requisites:	None	

AIMS

To acquaint the student with the theoretical and practical modelling aspects of the finite element method including the use of pre- and post-processing graphical interfaces.

LEARNING OUTCOMES

The student should be able to:

- Set up the stiffness and load matrices for a simple structure and solve for the displacements
- Derive the shape functions and B matrices for two dimensional finite elements
- Calculate the strains and stresses inside a finite element given the nodal displacements
- Describe the basic concepts and procedures for dynamic or non-linear finite element analysis
- Describe the basic concepts and procedures for isoparametric finite elements
- Carry out a finite element analysis of a plane stress or plane strain problem using a commercial package
- Assess the accuracy of the results of a finite element analysis

TEACHING AND LEARNING PATTERN

Lectures and tutorials ..

INDICATIVE CONTENT

Overview of analysis procedure. Theory of elasticity (revision). The stiffness method. Shape functions.

Calculation of element stiffness matrices and loads. Isoparametric elements. Dynamic modelling.

Non linear analysis. Modelling aspects Selection of element type and mesh density.

Preparation of input data. Assessment of results. Use of graphical pre-and post-processors.

ASSESSMENT METHOD

The unit is assessed by a combination of examination and coursework with the proportion of marks allocated to each component given below:

Examination: 70%

Coursework: 30%

INDICATIVE SOURCES

Cook, R.D., Finite Element modeling for stress analysis, Wiley, 1995.

Timoshenko, S.P. & Goodier, J.N., Theory of elasticity, Mc-Graw-Hill, 3rd ed., 1970.