LONDON SOUTH BANK UNIVERSITY

unit guide

Statics

BCE-1-118

Faculty of Engineering, Science and the
Built Environment

2007-08

become what you want to be

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1 UNIT DETAILS

Unit Title:	Statics
Unit Level:	1
Unit Reference Number:	BCE-1-118
Credit Value:	1.0
Student Study Hours:	90
Contact Hours:	60
Pre-requisite Learning (If applicable):	None
Course(s):	
Year and Semester	Year 1; Semester 1
Unit Coordinator:	M H Datoo
UC Contact Details (Tel, Email, Room)	020 7815 7388, m.datoo@lsbu.ac.uk BR-T-601
Teaching Team & Contact Details (If applicable):	M H Datoo
Subject Area:	Civil Engineering
Summary of Assessment Method:	Continuously Assessed

2 SHORT DESCRIPTION

This unit offers the first introduction to statics of structures. Fundamentals of statics are explained and numerous worked examples are used to complement the understanding of statics. Students are introduced to structural element and associated load types, the various support types and the calculation of structural section properties. Also covered are the axial, shear and bending load distributions in simple determinate structures. The determination of member forces in trusses and the determination of displacements are also covered. Three pin frames are considered for the determination of reactions and bending moments. Finally, students are subjected to a demonstration session of using a structural analysis computer program.

3.0 AIMS OF THE UNIT

To develop a through understanding of the fundamentals of statics of determinate structures, and using a simple structural analysis software.

4 LEARNING OUTCOMES

4.1 KNOWLEDGE AND UNDERSTANDING

- appreciate the types of structural elements
- distinguish between unsymmetric, singly symmetric and doubly symmetric sections
- recognise and understand the different load types – axial, shear, bending and torsion
- recognise and appreciate the structural response of simple, pinned, roller and fixed support types
- understand the fundamentals of static equilibrium
- understand the structural behaviour of truss frames
- understand the structural behaviour of three pin frames

4.2 INTELLECTUAL SKILLS

- calculate common structural section properties of symmetric and unsymmetric sections
- determine support reactions for determinate structures subjected to a combination of loads
- draw shear force and bending moment diagrams for determinate structures
- calculate member forces and deflections in trusses

4.3 PRACTICAL SKILLS

- interpret correctly the section properties, shear force and bending moment diagrams from a computer output

4.4 TRANSFERABLE SKILLS

- be able to perform section properties calculations for uncommon structural sections
- appreciate load paths analysis in complex structures
- appreciate the significance of basic structural design
- appreciate the significance of particular reinforcement types in concrete members subjected to various load types
- using structural analysis software for more complex structures

5 INTRODUCTION TO STUDYING THE UNIT

5.1 OVERVIEW OF THE MAIN CONTENT

Load Types
Point loads, uniformly distributed loads, axial, shear, bending, and torsion.

Support Types
Simple, pinned, roller, fixed.

Equilibrium
Fundamental principles of static equilibrium, reactions.

Section Properties
Area, centroid, second moment of inertia, parallel axes theorem, radius of gyration, elastic section modulus.

Analysis of Determinate Beams and Frames
Reactions, shear force diagrams, bending moment diagrams, location of maximum bending moment.

Pin Jointed Frames
Member forces using the method of joints, determination of deflections using the energy method

Three Pin Frames
Support reactions and bending moment diagrams

5.2 OVERVIEW OF TYPES OF CLASSES

Lectures and tutorials will be supplemented by handouts and worked solutions.

The timetabled day is Tuesdays and Fridays; a lecture and tutorial/test session on each day.

5.3 IMPORTANCE OF STUDENT SELF-MANAGED LEARNING TIME

The successful passing of this unit is very much dependent on the student spending a lot more private study time. For this unit, this involves the student attempting all the tutorial sheets. A unit like this cannot be studied at the last minute; the effort has to be continuous and steady throughout the semester.

6 THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Week Beginning	Teaching Week No	Lecture
24 September 2007	1	Materials Introduction to design
1 October	2	Section Properties - doubly symmetric sections
8 October	3	Section properties - singly symmetric section
15 October	4	Section properties - unsymmetric sections Computer lab
22 October	5	Plane statics – beams Computer lab
29 October	6	Plane statics – frames
5 November	7	Shear force diagrams – beams
12 November	8	Bending moment diagrams – beams
19 November	9	Bending moment diagrams – frames
26 November	10	Pin jointed frames
3 December	11	Pin jointed frames
10 December	12	Three pin frames
17 December		Christmas vacation
24 December		Christmas vacation
31 December		Christmas vacation
7 January 2008	13	Three pin frames
14 January	14	Examinations
21 January	15	Examinations

7 ASSESMENT OF THE UNIT

100% Continuously assessed.
Open book in-class tests, typically of one hour duration, will be set at regular intervals during the semester.

Students missing a test will get a zero mark, unless a doctor's medical note is produced, confirming illness on the day of the test, in which case the average will be adjusted accordingly.

For any other exemption, the average will be adjusted only upon a supported Mitigating Circumstances procedure.

A resit paper will be set in the resit examination weeks. This will be an open book supervised test in which all questions must be attempted.

8 LEARNING RESOURCES

8.1 CORE MATERIALS

Smith; Materials and Structures, Longman, 1986.

Marshall & Nelson; Structures, Longman, 1990.

Croxton & Martin; Solving Problems in Structures, Volume 1, Longman, 1991.

Whitlow; Materials and Structures, Longman, 1991.

Durka, Morgan & Williams; Structural Mechanics, Longman, 1996.

Smith; Introduction to Structural Mechanics, Palgrave, 2001

Hulse, Sherwin and Cain, Solid Mechanics, Palgrave, 2003.

Jennings, A, Structures – From Theory to Practice, Spon, 2004

Bedford & Fowler, Statics, Pearson, 2005.

Megson; Structural and Stress Analysis, Elsevier, 2005.

Hibbeler, Mechanics of Materials, Pearson, 2005.

Hibbeler, Statics, Pearson, 2007.

Hibbeler, Structural Analysis, Pearson, 2006.

McKenzie, Examples in Structural Analysis, Taylor & Francis, 2006.

MDSolids software, www.mdsolids.com (and on LSBU Network)