LONDON SOUTH BANK UNIVERSITY

UNIT GUIDE

Forensic engineering and Conservation

BCE_2_223

Bb site

FESBE

2007-8

become what you want to be

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1. UNIT DETAILS

Unit Title:	Forensic engineering and conservation
Unit Level:	2
Unit Reference Number:	BCE_2_223
Credit Value:	1 unit
Student Study Hours:	150
Contact Hours:	60
Private Study Hours:	90
Pre-requisite Learning (If applicable):	B Sc 1 or equivalent
Co-requisite Units (If applicable):	
Course(s):	B Sc Civil, Architectural Engineering
Year and Semester	Year 2 Semester 2
Unit Coordinator:	K G Smith
UC Contact Details (Tel, Email, Room)	Ken.smith@lsbu.ac.uk 7118
Teaching Team & Contact Details (If applicable):	
Subject Area:	Civil engineering
Summary of Assessment Method:	50/50 coursework/exam

2. SHORT DESCRIPTION

This unit uses mainly case studies to develop the principles introduced in first year design and mechanics units by looking at the influence of failures on the evolution of professional practice. It teaches students an understanding of holistic design applications, conservation, and the role of regulations. It teaches, develops and assesses observational, deductive, creative and communications skills.

3. AIMS OF THE UNIT

To encourage curiosity about real structures; to educate, inform and inspire students to become safe construction team members, by using case studies of damaged or repaired structures.

To introduce forensic and conservation engineering principles. To encourage engineering judgement and a professional attitude to personal development plans.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

Understand the multifaceted causes and implications of structural engineering failures.
Understand forensic investigation, reporting and legal procedures.
Understand the characteristic effects of extreme loads and the implications for designers.
Understand the aims of conservation engineering, and the supporting technology.

4.2 Intellectual Skills

Identify characteristic problems and solutions in older or defective structures.
Identify repair techniques, planned maintenance and emergency procedures.

4.3 Practical Skills

Record and learn from newly reported failures as part of a continuing personal development plan.

4.4 Transferable Skills

Participate at a professional team meeting about either a forensic or conservation issue.
Discuss the historical influence of major disasters in civil engineering.

5. ASSESSMENT OF THE UNIT

50 % coursework (reports, seminar presentations, class tests. etc.)

Site visit to Canary Wharf/Greenwich	10%
Buildings defects report	15%
Legal aspects of conservation	10%
Forensics in the news logbook	5%
Group presentation	10%

50% 2 hour examination

6. INTRODUCTION TO STUDYING THE UNIT

6.1 Overview of the Main Content

Forensic case studies
Structural configuration, global behaviour and failure modes. Element configuration and failure modes. Failure of joints and bonding. Materials failures. Systemic failures. Lessons for designers. SCOSS. Conducting and managing a forensic investigation.

Health and safety, risk assessment. The parties. Courts. Expert witness duties and evidence. Measurement, monitoring and records. Diagnosis flowchart. Common defects.

Exceptional loads and phenomenological behaviour.
Seismic, impact, explosive, machine, wind and waves loads. Geotechnical problems, foundation failures and site vulnerability. Environmental damage. Ductility. Non-structural component failure, fires and lifeline system failure. Loss minimization strategies and planning. Temporary supports, demolition. Retrofit systems.

Conservation engineering.
Philosophy and management. Regulations. Ecclesiastic buildings, listed buildings. Lessons from traditional construction. Materials, workmanship and control. Combinations of loadings and responses. Economic upgrading of traditional buildings and non-structural elements. Maintenance and repair strategies. Geotechnics. Geophysical surveys. Archives. Test loads. Test loads.

Historical case studies.
Buildings, public health, ports, maritime structures waterways, railways. Computers: software limitations and advantages. Professional development.

6.2 Overview of Types of Classes

Lectures and discussions

6.3 Importance of Student Self-Managed Learning Time

Developing an enquiring attitude to the urban environment through coursework is beneficial.

6.4 Employability

A considerable part of the GNP goes into related tasks.

7. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Case studies and overviews presented at lectures. Lectures and tutorials supplemented by printed handouts. Each student will have an individual project and a seminar assignment to present. All students will be encouraged to actively participate in all seminars.

8. LEARNING RESOURCES

8.1 Core Materials

Primarily lecture material
New Civil engineer weekly disaster reports

8.2 Optional Materials

Why Buildings Fall Down, M. Levy, M. Salvadori, Norton & Company Ltd, 2002.
Learning from Construction Failures: Applied Forensic Engineering, P. Campbell (Editor), Whittles Publishing, 2001.
Design Paradigms, Henry Petroski, Case histories of error and judgement in engineering. Cambridge 1994.
Forensic Engineering: A Professional Approach to Investigation Thomas Telford Ltd 1999.
The Mexican earthquake of 19 September 1985: a field report by EEFIT, London: SECED, 1986.
The Stone Skeleton, J. Heyman. Cambridge 1995.
Old waterfront walls, R. Bray & P. Tatham. Spon 1992.
Practical Building Conservation. (English Heritage Technical Handbooks) Volumes 1-4. J. & N. Ashurst, Gower Press 1996.
Appropriate topical articles from NCE.