LONDON SOUTH BANK UNIVERSITY

unit guide

ACCIDENT ANALYSIS AND INVESTIGATION

UNIT SFO-3-160

LEVEL 3

become what you want to be

Unit leader: Dr C.H Steele

Faculty of Engineering Science and Technology

2004-2005 academic session

UNIT SFO-3-160, ACCIDENT ANALYSIS AND INVESTIGATION

Basic data

Level:	3	***Subject area:***	SAS1
Credit value	1	***Semester***	1
Class contact hours	48	***Student managed study hours***	102
Pre-requisites	None		
Unit leader	Dr C.H Steele	*Room:E240*	*Tel:02078157901*
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Other teachers	Prof. P.F.Nolan	*Room: E238*	*Tel:02078157901*
			E-mail:NONE

Assessment

Element	*Description*	*Weighting*
Examination	Unseen examination	50%
Project	5000 word report	50%

Short introduction to the unit

This unit is designed to give students' detailed knowledge and a good insight into the field of accident investigation. The lecture course gives a formal grounding in those techniques of risk analysis necessary to predict the probability and magnitude of an accident. Equally the lecture course focuses on the anatomy of several prominent accidents to exemplify accident analysis, reconstruction and determination of root cause. Some emphasis will be given to the need for quantitative information as the basis of objectivity and the corner stone for a judicial or government enquiry. Whilst equations will be given there will be a bias towards understanding rather than numerical manipulation. To balance this approach consideration will be given to the human aspects of accident analysis which all to frequently lie behind root cause.

Aims

To introduce students to the analysis of accidents, particularly the identification of the root cause and to demonstrate how a number of techniques (physical experiments and/or computer-based simulations) can be used in the reconstruction of incidents to gain an understanding of the events, roles, procedures and behavior involved.

Learning Outcomes

On successful completion of this unit students will be able to:-

1. Be aware of information sources and methods of analysis of accidents.

2. Be familiar with probabilistic data and confidence limits on data.

3. Understand the method of identifying the root cause and the use of keywords at analysis meetings.

4. Have experience of undertaking a case study of an incident and determining the time-based sequence of events (STEP procedure)

5. Be familiar with the past experience of designing and operating incident reconstructions - either by computer simulation or physical experiment.

6. Be aware of the importance of communications and be capable of writing an accident report, incorporating scientific evidence and its relationship to the understanding of the accident.

Indicative Content

Engineering risk and the public perception of risk.

Introduction to the methods of hazard identification. Hazard operability studies.

Fault tree and event tree analysis. Failure mode and effects analysis. Consequence modeling.

Toxic Release and Dispersion in the Chemical and Nuclear Industry.

Emergency planning

Selected case studies.

Uses of probability data. Confidence levels. Definitions and examples of personal accidents, technical incidents, omissions and deliberate malicious acts. Statistical data on incidents. Accident analysis sources and methods of intelligence gathering. Linked incidents and their identification.

Classification of accidents. Accident ratios.. Root causes. Identification and analysis methods to determine root causes. Sociotechnical system framework. Combinations of related and unrelated events prior to incident. Sequence of events. Sequential time event plotting (STEP) procedures. Keyword usage at meetings and in analysis of incidents. Use of keywords to define causes in illustrative case studies

Defining the scope and planning a scientific investigation. Physical evidence from the scene and the role of supporting scientific experiments. The need for quality control in testing physical evidence. Reconstruction of incidents. Case histories on incident reconstructions including their limitations. Analysis methods applied to human behaviour and response in relation to their specific role prior, at and immediately after the incident e.g. management, emergency services, eyewitnesses, victims. Communication systems. Reporting of scientific analysis. The expert witness.

Teaching Method

[A] Formal lectures and seminar discussion. Students will be shown a series of videos which examine carefully chosen incidents which will be followed through with detailed discussion. Students will also be encouraged to use library resources and the world wide web to examine issues arising from discussion in a wider context. Web site suggestions will be given out during the course of lectures together with a limited number of lecture notes.

[B] Students will be allocated a project tutor. Each student will be required to carry out their own individual case study. Students will be required to submit a project proposal which must be approved by the project tutor. Projects should be approximately 3000 words in length and fully referenced.

Weekly teaching and learning programme

The programme of classes below is intended only as a guide and is subject to modification according to rate of progress and unforeseen factors.

Week 1: Introduction to unit. The investigative procedure. Eye witness accounts. PFN/CHS

Week 2: Hazard Identification. Hazard assessment methodologies. Introduction of project course work. Definition of risk. PFN/CHS

Week 3: Establishing a time line. Consideration of evidence. The role of Scientific analysis. Examples of hazard assessment methodologies. Requirements of project course work, structure and content. Literature sources. Referencing. Links with psychology and law. Public perception of risk. PFN/CHS.

Week 4: Consequence analysis. Toxic release and dispersion mapping. PFN/CHS

Week 5: Procedures in risk assessment. PFN/CHS

Week 6: Accident classification. Pre-emergency planning. PFN/CHS

Week 7: Government enquiries. Corporate responsibility. Case history; fire and explosion. PFN/CHS

Week 8: Case histories; transport accidents. PFN/CHS

Week 9: Case histories; industrial incidents. PFN/CHS

Week 10: Case histories; accidents leading to major incidents/ fatalities. Escalation scenarios. Pre emergency planning. PFN/CHS

Week 11: Reconstruction and analysis. PFN/CHS

Week 12: The special case of terrorism. Planning for terror.

Note: PFN = Prof P.F. Nolan CHS= Dr C.H. Steele

Assessment

50% written examination and 50% on coursework project. The coursework project will incorporate a root cause analysis of a major incident. it is expected that students will work in pairs or trios.

This unit is assessed by course work only

Students have to complete one course work : This will take the form of a 5000 word project which will comprise 50% of the overall unit mark. You should discuss the nature of you project thoroughly before starting it. The project will gain you valuable marks so its worth putting in some effort here. Make sure you understand exactly what is required from you. Consider the aim of your project and the objective which you will set yourself in order to meet you aim.

Details on submission of coursework

The deadline for the submission of the coursework by Friday of Week 13. There is NO flexibility in these deadlines.

Students should be reminded that the University has a policy on late submission of coursework and on claiming for mitigating circumstances.

Remember the coursework element of the assessment is made up of only one 5000 word project. includes two coursework projects

	% of Unit Marks
Exam	50%
Coursework (Project)	50%
TOTAL	100%

Recommended reading

CORE

G.L Wells; Major hazards and their management I.Chem. E (1997)

J.R. Thompson; Engineering Safety Assessment. Longman (Wiley) (1987)

On-line materials

As directed by lecturer during the progress of the course.