Subject Description Form

Subject Code	CSE39482
Subject Title	Structural Resilience and Fire Risk Management
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	(1) To introduce the basic theories of fire and risk management in civil and building engineering. (2) To provide students with a solid bridge between theories and practical implementation for fire prevention and hazard assessment. (3) To prepare students for tackling practical problems of fire risk management, with a combination of theoretical background and engineering sense.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand terminology and issues related to fire hazards and flammability assessment methods for engineering and research. b. Understand the relationship between fire protection design issues and fire performance. c. Determine the appropriate methods for fire safety audit, hazard and risk assessment, and reliability test. d. Identify and classify different types of combustibles in buildings e. Apply basic calculation techniques to assess fire risk and performance.

Subject Synopsis/ Indicative Syllabus	1. Introduction to hazard and risk (1 week) Background and definitions of fire hazard and risk. Common hazard and risk in civil engineering and building. Fire risk principles. 2. Fire safety regulation (1 week) Fire safety ordinance in Hong Kong. Checklist for major defects of fire service installation drawing. 3. Fire protection design issues (1 week) Fire protection planning with considering building components. Fire protection design with code compliance. 4. Project review, risk management approaches (2 weeks) Fire risk assessment process. Risk assessment objectives, metrics, and thresholds. Hazard, event and scenario identification. Sources of data for risk assessment. 5. Risk and hazard analysis (logic trees, fault trees, etc.) (2 weeks) Frequency analysis, consequence analysis. Risk estimation. 6. Engineering economics (2 weeks) Qualitative method. Semi-qualitative criteria-based methods. Quantitative methods. Cost-benefit risk methods with net present value (NPV). Life safety and financial assessments. 7. Probability, reliability, and uncertainty (2 weeks) Probabilistic risk assessment. The British Standards Institute's fire-related design standards. 8. System performance evaluation (1 week) Documenting performance and evaluations. Appraisals of performance. Manager's responsibility for performance evaluation. 9. Group presentation (1 week)

Teaching/Learning Methodology

In this subject, various teaching/ learning activities and assessment approaches are employed to facilitate collaborative learning both inside and outside of the classroom.

Basic concepts and techniques are being introduced in **weekly lectures**, achieving learning at the knowledge level.

Students are expected to look for and read supplementary reading materials (such as reports, newspaper articles, websites, and videos) to reinforce their knowledge and broaden their learning. In the **interactive tutorial sessions**, students will present, discuss, analyze, or debate the reading materials to stimulate **critical thinking and higher-order reasoning**. In the tutorial sessions, students will have the opportunity to apply the numerical techniques learned in class through exercises.

Students will work on a group project to **consolidate** the learning gathered from various lectures and tutorials and to generate their insights. The group project would require students to **research** on a specific OBOR transport infrastructure project, document their findings in a **written report** and also **oral presentation**.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% Weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Midterm test	15	√	√	√		
2. Presentation	10	√	√	√	√	√
3. Report	15	√	√	√	√	√
4. Final Examination	60	√	√	√	√	√
Total	100					

Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Student Study Effort Expected

Class contact:	Average hours per week
▪ Lectures / Tutorials	3 Hrs.
Other student study effort:	
▪ Coursework	2 Hrs.
▪ Self Study	2 Hrs.
▪ Prepare project report and presentation	2 Hrs.
Total student study effort	9 Hrs.

Reading List and References	**References:** Hurley et al. SFPE Handbook of Fire Protection Engineering, Springer, 2016 Fire Safety and Risk Management: for NEBOSH National Certificate in Fire Safety and Risk Management, Routledge, 2014. Fire Safety Management, CRC Press, Taylor & Francis Group, 2014. Fire Safety Journal, Elsevier: https://www.sciencedirect.com/journal/fire-safety-journal Fire & Risk Management Journal: https://www.frmjournal.com/