Subject Description Form

Subject Code	EE3009C
Subject Title	Electrical Services in Buildings
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2002C
Objectives	1. To enable students to describe the major design features, operating characteristics and functions of electrical and electronic equipment used in building services. 2. To enable students to implement technical data, regulations, standards and guidance notes prepared by statutory bodies in the design of reliable, safe and efficient electrical power distribution, lightning protection, vertical transportation, and lighting systems in buildings.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Be able to plan efficient, safe and high quality distribution systems for domestic, commercial and industrial buildings. b. Be proficient to assess the suitability of different vertical transportation systems for buildings. c. Be able to design and evaluate the effectiveness of lightning protection systems. d. Be able to integrate the lighting requirements and operating characteristics of light sources to the design of interior lighting and exterior lighting. e. Be able to search for information in solving technical problems.
Subject Synopsis/ Indicative Syllabus	1. ***Power distribution in buildings*****:** System planning. Incoming supply arrangement for domestic, commercial and industrial installations. Economics of HV/LV distributions. Tariffs, maximum demand, load factors and diversity. Earthing systems. Applications of standby generator sets and uninterruptible power supplies. 2. ***Requirements for safe design*****:** Overview of Supply Rules and Regulations. Electric shock, overcurrent and earth fault protection. Fuse, MCB, MCCB, ACB design and selection criteria. Co-ordination of protection systems. Cable and wiring systems design. 3. ***Interference and power quality*****:** Installation requirements, grouping, interference, noise suppression and power supply in communication systems. Electromagnetic compatibility. Harmonics and voltage dips issues. 4. ***Lightning protection systems*****:** Lightning phenomena. Estimation of exposure risk. Requirements for system components. Standards for protection of structures against lightning. 5. ***Vertical transportation systems*****:** Lift. Hoist and escalator drives. Safety requirements and drive characteristics. Grade of service and round trip time. 6. ***Lighting*****:** Characteristics of light sources. Classification of luminaries. Lighting control. Interior lighting design. Glare index calculation. Color rendering. Utilization of daylight. Exterior lighting design.

Case Study:

1. Distribution systems design for typical buildings in Hong Kong
2. Applications of overcurrent and earth fault protection
3. Co-ordination of various types of protective devices
4. Electrical power quality issues in building services
5. Lightning protection systems design
6. Interior lighting and exterior lighting designs

Teaching/Learning Methodology

In lectures and tutorials, materials that emphasize practical problem-solving methods are balanced with materials that emphasize fundamental understanding. Students are expected to take initiative to learn through the process of engagement and participation in lectures and tutorial sessions. Practical designs used in industry, where appropriate, are discussed interactively in class. Mini-Projects are used to enhance students learning experiences and practical applications. They provide students with the opportunity to develop independent design/planning and technical report writing skills pertinent to the field of electrical services in buildings.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	✓	✓	✓	✓	
Tutorials	✓	✓	✓	✓	
Mini-projects	✓	✓	✓	✓	✓

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. Examination	60%	✓	✓	✓	✓	
2. Mid-term Test	18%	✓	✓	✓	✓	
3. In-class Quiz	4%	✓	✓	✓	✓	
4. Mini-project & report	18%	✓	✓	✓	✓	✓
Total	100%					

The subject outcomes on planning, design, effectiveness evaluation of electrical services in buildings are assessed by means of examination, quizzes and tests. The outcomes on engineering skills, applications, problem solving techniques, as well as technical writing, are evaluated by mini-project and reports.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Mini-project discussion/report	20 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	105 Hrs.

Reading List and References	**Textbooks and Reference books:** 1. R. Barrie, Design of Electrical Services for Buildings, Routledge, 4th edition, 2005 2. G. Stokes, J. Bradley, A Practical Guide to the Wiring Regulations: 17th Edition IEE Wiring Regulations (BS 7671:2008), Wiley-Blackwell, 4th edition, 2009 3. G.C. Barney, Elevator Traffic Handbook: Theory and Practice**,** Routledge, 2nd edition, 2016 4. The SLL Lighting Handbook, The Society of Light and Lighting, Chartered Institution of Building Services Engineers, 2018 5. F. Hall**,** Building Services Handbook**,** Routledge, 9th edition, 2017 6. HKSAR EMSD, Code of Practice for Electricity (Wiring) Regulations 2020

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