

Liverpool John Moores University

Title: ELECTRICAL SERVICES INSTALLATIONS
Status: Definitive
Code: **4608BEFDL** (123921)
Version Start Date: 01-08-2016

Owning School/Faculty: Built Environment
Teaching School/Faculty: City of Liverpool College

Team	Leader
Alfred Leung	Y

Academic Level: FHEQ4 **Credit Value:** 20 **Total Delivered Hours:** 75
Total Learning Hours: 200 **Private Study:** 125

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	60
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	FORMAL EXAMINATION	40	3
Report	AS2	TECHNICAL REPORT	60	

Aims

The aim of this module is to develop the students' understanding of the main principles and practices for the design, operation and commissioning of electrical building services systems, and fire detection & security systems in medium sized public sector, commercial or industrial buildings. The module provides students with the knowledge and skills necessary to interpret the needs and requirements of buildings and develop and evaluate a range of practical, efficient and sustainable schemes.

Learning Outcomes

After completing the module the student should be able to:

- 1 Produce and evaluate detailed low and extra low voltage electrical distribution system designs to satisfy the needs of complex buildings.
- 2 Establish the need for circuit protection, lightning protection and surge protection in electrical services installations in buildings and apply this to electrical services design
- 3 Apply relevant legislation, standards and strategies for fire safety, fire engineering and security systems to establish requirements for buildings.
- 4 Produce and evaluate detailed designs for fire detection and alarm installations, security detection, monitoring and alarm installations.
- 5 Describe the principles and characteristics of fire growth and propagation and smoke dynamics in buildings.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

FORMAL EXAMINATION	3	5	
TECHNICAL REPORT	1	2	4

Outline Syllabus

Specification and requirements: analysis of client and building needs,

Design criteria and standards: designing for health and safety, risk assessment to identify potential risks. Identification of current design standards, legislative constraints and associated publications.

Design of electrical installations: distribution patterns, horizontal, vertical, provision for future development and access. Co-ordination of services. False floor systems, rising mains, sub-main, bus-bar, trunking, conduit, ducting etc. Incorporating resilience, Design of installations incorporating environmental technologies i.e. photo-voltaic, wind turbine installations into electrical installation designs.

Accommodation of HV substations: civil requirements, design and plant layout, access, security and safety. Inclusion of current design standards and legislative requirements into designs.

Fundamental requirements for safety: earthing systems and equipment for electrical installations in complex buildings and the inspection & testing of electrical installations to current BS7671 requirements.

Applying designers' discretion: Assessment of electrical loads, volt-drop, diversity, extending disconnection times, thermal effects, grouping of cables of different c.s.a.

and load characteristics, sizing of cables for motor circuits: direct on line, star delta, and inverter control.

Circuit protection: The determination of fault-currents and the application of methods for providing circuit over-current and short circuit protection. The selection of fuses, MCB's, and MCCB's for building services installations including variable loads and those consuming heavy currents. Apply BS7671 and/or manufacturer's device operating time-range & characteristics data to protective device selection methods.

Apply the principles of Discrimination to the selection of protective device ratings. Data Distribution: Category of circuits, types of distribution topologies, Current standards and protocols for cable and fibre-optic installations, cable types, clean and dirty earth's, earth loops, interference, emission of heat, vibration, earth leakage currents, data/telecommunication, control and SCADA installations, electromagnetic compatibility; conducted, electrostatic, radiated.

Lightning and Surge protection: current design standards, determining susceptibility to lightning strike, air termination network, down conductors, earth termination networks, bonding, side-flashing, protection of electrical and data equipment within buildings, cable routes and equipment location.

Learning Activities

Lectures and tutorials sessions

Notes

This module is a key component for those students wishing to complete the programme following an 'electrical' building services pathway. It aims to develop an understanding of the principles and processes of electrical, lighting and data installations in commercial and industrial buildings. Furthermore it aims to develop an understanding of the design and specification of modern fire detection and security installations, and integrating these with other building services systems.