

Liverpool John Moores University

Title: CONTROLS & BUILDING MANAGEMENT SYSTEMS
Status: Definitive
Code: **5503BEFDS** (118446)
Version Start Date: 01-08-2011

Owning School/Faculty: Built Environment
Teaching School/Faculty: Built Environment

Team	Leader
Derek King	

Academic Level: FHEQ5 **Credit Value:** 12.00 **Total Delivered Hours:** 63.00
Total Learning Hours: 120 **Private Study:** 57

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	36.000
Tutorial	24.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Report	Project based assignment	50.0	
Exam	Exam	Formal examination	50.0	3.00

Aims

The aim of this module is to develop the students' understanding of the application of control systems for mechanical and electrical building engineering services in general and the principles, application and use of computerised Building Management Systems (BMS) in particular. It will enable learners to interpret the potential management and control requirements of a building and its facilities, and develop practical schemes for the specification and installation of BMS in complex buildings.

Learning Outcomes

After completing the module the student should be able to:

- 1 Identify the control and management needs of buildings and the characteristics of Building Management Systems.
- 2 Investigate BMS hardware, functions and applications.
- 3 Produce designs for BMS installations and generate BMS software logic to achieve required control strategies.
- 4 Generate and use reports and data to adjust BMS installations and optimise the performance and derived benefits.

Learning Outcomes of Assessments

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

Project based report	1	4
Exam	2	3

Outline Syllabus

Management and control requirements for buildings: Need for: environmental and lighting control, lift and escalator control, security and fire detection control. Need for power generation and load management control, maximum demand, power factor and other load management techniques. Use of BMS to manage the maintenance requirements of plant and systems, type and frequency of maintenance. Need for energy monitoring and techniques used to monitor energy sources and consumption. Setting realistic energy targets; role of Building Regulations, BREEAM etc in design and specification of BMS installations, energy target assessments

Justification for BMS: benefits of BMS installations v financial implications.

Justification of the decision to use a BMS.

Characteristics of Building Management Systems: BMS terminology, functions of BMS, analogue and digital control, environmental monitoring, plant switching, data monitoring and logging, reporting. Types and configuration of BMS, the role of BMS within intelligent buildings. SCADA and PLC systems. Comparison of centralised v decentralised systems.

Hardware components of BMS installations: analogue and digital condition sensors, actuators and metering devices. BMS control panel components, power supplies, switching and protection equipment. Wiring and earthing requirements. Wiring configuration including LAN, WAN, networks, LON-Works and BACNET. System Integration and types of intelligent processors.

Control functions: identification of control requirements, Use of BMS to achieve optimisation, compensation, sequencing, plant switching, cascade control, night time cooling etc.

BMS system design and specification: control logic for Mechanical & Electrical engineering services installations. Planning of control strategies and Installations, control drawings. Symbols and annotation of drawings. Control points count schedules. Selection of outstations and intelligent . BMS equipment schedules

and specifications.

BMS Software: node numbers and functions from controls logic drawings. Use of BMS software to generate programmes. Commissioning requirements, procedures and documentation.

System operation: system logic, analysis of settings and operating conditions on installed equipment. Monitoring and making adjustments to BMS settings.

Interrogating BMS installations for system performance reports.

Maintenance and PPM data: use of BMS as part of a planned preventative maintenance (PPM) programme. Plant running times, production of maintenance reports, monitoring of plant breakdown, alarm strategies, integration of BMS reports into PPM regimes

Energy management and optimisation techniques: monitoring of physical energy usage of buildings. Interpretation of BMS reports. Optimisation of plant and buildings energy performance

Learning Activities

Lectures, tutorials, case studies, workshops and site visits.

References

Course Material	Book
Author	Chartered Institution of Building Services Engineers
Publishing Year	2000
Title	Guide H
Subtitle	Controls
Edition	
Publisher	CIBSE
ISBN	07506 504 78

Course Material	Book
Author	Chartered Institution of Building Services Engineers
Publishing Year	2005
Title	Knowledge Series KS4
Subtitle	Understanding Controls
Edition	
Publisher	CIBSE
ISBN	1903287634

Course Material	Book
Author	Martin A. & Banyard C.
Publishing Year	1998
Title	Library of system control strategies
Subtitle	
Edition	

Publisher	BSRIA
ISBN	086022497 X

Course Material	Book
Author	BRECSU
Publishing Year	1998
Title	DoE General Information Report 40
Subtitle	Heating Systems and Their Control
Edition	
Publisher	BRECSU
ISBN	978 1 85946 219 5

Course Material	Book
Author	ODPM
Publishing Year	2006
Title	Approved Document L2A & B
Subtitle	Conservation Of Fuel And Power
Edition	
Publisher	ODPM
ISBN	978 1 85946 220 1

Course Material	Book
Author	Day, A. Ratcliffe M. Shepherd K.
Publishing Year	2003
Title	Heating Systems Plant and Control
Subtitle	
Edition	
Publisher	Blackwell Publishing (UK)
ISBN	0632059370

Notes

The module aims to develop the students understanding of the principles of building services control addressed in several of the modules in the programme into an understanding of the application and use of modern Building Management Systems.