

Liverpool John Moores University

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Title: CONTROLS AND BUILDING MANAGEMENT SYSTEMS
Status: Definitive
Code: **5004BEFD** (108466)
Version Start Date: 01-08-2011

Owning School/Faculty: Built Environment
Teaching School/Faculty: Liverpool Community College

Team	Leader
Derek King	Y

Academic Level: FHEQ5 **Credit Value:** 12.00 **Total Delivered Hours:** 57.00
Total Learning Hours: 120 **Private Study:** 63

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42.000
Tutorial	12.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Open book controlled assignment under exam conditions	60.0	3.00
Portfolio	AS2	Project based coursework	40.0	

Aims

The aim of this unit 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.

To enable learners to interpret the potential management and control requirements

of a building and its facilities, develop practical schemes for the specification and installation of BMS in complex buildings and maximise the benefits derived from the use of BMS.

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 to achieve required control strategies.
- 4 Monitor and adjust BMS installations to optimise the performance and benefits derived from the system.

Learning Outcomes of Assessments

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

EXAM	1	2	3	
Project	1	2	3	4

Outline Syllabus

Management and control requirements for buildings: environmental and lighting control requirements. Need for lift and escalator control. Requirement for security and fire detection control.

Need for power generation and load management control: maximum demand, power factor and other load management techniques used.

Maintenance requirements of plant and systems, type and frequency of maintenance.

Need for energy monitoring: techniques used to monitor energy sources and consumption. Setting realistic energy targets,

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.

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.

BMS system design and specification: control logic for Mechanical & Electrical engineering services installations. Planning of control strategies and installations. controls 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, site visits.

References

Course Material	Book
Author	CIBSE
Publishing Year	2000
Title	Guide H: Controls
Subtitle	
Edition	
Publisher	CIBSE
ISBN	0750650478

Course Material	Book
Author	CIBSE
Publishing Year	2005
Title	Knowledge Series KS4: Understanding Controls
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287634

Course Material	Book
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Author	Martin, A. & Banyard, C.
Publishing Year	1998
Title	Library of System Control Strategies
Subtitle	
Edition	
Publisher	BSRIA
ISBN	086022497X

Course Material	Book
Author	DoE
Publishing Year	1998
Title	General Information Report 40: Heating Systems and Their Control
Subtitle	
Edition	
Publisher	BRECSU
ISBN	

Course Material	Book
Author	ODPM
Publishing Year	2006
Title	Approved Document L2A: Conservation of Fuel and Power
Subtitle	
Edition	
Publisher	ODPM
ISBN	1859462195

Course Material	Book
Author	ODPM
Publishing Year	2006
Title	Approved Document L2B: Conservation of Fuel and Power
Subtitle	
Edition	
Publisher	ODPM
ISBN	1859462201

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

Course Material	Book
Author	Roper, M.

Publishing Year	2000
Title	Energy Efficient Chiller Control
Subtitle	
Edition	
Publisher	BSRIA Ltd
ISBN	0860225658

Course Material	Book
Author	Dicks, M. & Brown, R.
Publishing Year	1997
Title	Heating Controls in Large Spaces
Subtitle	
Edition	
Publisher	BSRIA
ISBN	0860224767

Course Material	Book
Author	Levermore, G.
Publishing Year	1999
Title	Building Energy Management Systems
Subtitle	
Edition	
Publisher	Spon Press
ISBN	0419225900

Course Material	Book
Author	Underwood, C.
Publishing Year	1998
Title	HVAC Control Systems
Subtitle	
Edition	
Publisher	Spon Press
ISBN	0419209808

Notes

The module develops 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.