

Liverpool John Moores University

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Title: HEATING B
Status: Definitive
Code: **5006BEFD** (108468)
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: 64.00
Total Learning Hours: 120
Private Study: 56

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42.000
Tutorial	12.000
Workshop	7.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Controlled assignment under exam conditions	50.0	3.00
Portfolio	AS2	Project based assignment	50.0	

Aims

To further develop the student's understanding of the principles and applications of heating installations. This is achieved by developing the students understanding and experience of the more specialised forms of space and process heating which tend to be associated with the large and complex heating installations.

Learning Outcomes

After completing the module the student should be able to:

- 1 Produce and analyse designs for steam systems for space and process heating.
- 2 Produce and analyse designs for high temperature hot water space and process heating.
- 3 Evaluate the use of district heating schemes.
- 4 Select and specify appropriate high temperature hot water and steam heating plant and primary energy sources for heating and hot water generation.
- 5 Design and evaluate the use of electrical heating systems for commercial/industrial buildings.

Learning Outcomes of Assessments

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

EXAM	1	2	3	4	5
Project	1	2	4		

Outline Syllabus

Properties of steam: heat content of pressurised water, wet, dry and superheated steam

Design of steam systems: layouts, plant arrangements, types, operation and requirements for steam traps, relay points, pressure reducing valves. Design of steam systems. Steam for process work. Use and design of flash steam recovery systems. Use of steam-to-water heat exchangers. Plant and equipment sizing and selection.

High Pressure Hot Water: methods of pressurisation, Analysis of safe working temperatures/pressures. Anti-flash margins. Effect of pump location.

Design of HPHW Systems: system design, installation and control arrangements. Expansion volumes, sizing and selection of plant including pressurisation plant, use of high temperature hot water, comparison with the use of low temperature hot water and steam systems. Conversion from high temperature hot water to low temperature hot water.

District heating schemes: Use and application of district heating, comparison with the use of individual plants. Alternative primary heat sources/fuels inc waste incineration, CHP schemes, geothermal sources. Distribution methodologies, operating temperatures, design of distribution networks, distribution ducting. Plant for district heating schemes Consumer charging and energy metering.

Heating plant, appliances and equipment: arrangements for saturated and superheated steam and high temperature hot water systems. Steam superheaters. Thermal efficiency of steam and high temperature hot water boiler plant. Boiler feed-water treatment, Blowdown rates, feed pumps.

Electrical heating: application of electrical space heating equipment. Immersion heaters, electrode boilers, thermal storage, trace heating, quartz/luminous heaters, embedded resistance cables.

Energy requirements: active store, daily design energy requirement and charge acceptance in storage heating.
Pressurised electrothermal storage systems: plant size and power requirements.

Learning Activities

Lectures, tutorials, case studies, site visits.

References

Course Material	Book
Author	Moss, K.
Publishing Year	2003
Title	Heating and Water Services Design in Buildings
Subtitle	
Edition	2nd Edition
Publisher	Spon Press
ISBN	0415291852

Course Material	Book
Author	Moss, K.
Publishing Year	1998
Title	Heat and Mass Transfer in Building Services Design
Subtitle	
Edition	
Publisher	Spon Press
ISBN	0419226508

Course Material	Book
Author	Underwood, C.
Publishing Year	1998
Title	HVAC Control: Modelling, Analysis and Design
Subtitle	
Edition	
Publisher	Spon Press
ISBN	0419209808

Course Material	Book
Author	CIBSE
Publishing Year	2006
Title	Guide A: Environmental Design
Subtitle	
Edition	
Publisher	CIBSE

ISBN	0903287669
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Course Material	Book
Author	CIBSE
Publishing Year	2005
Title	Guide B: Heating, Ventilation, Air Conditioning & Refrigeration
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287588

Course Material	Book
Author	CIBSE
Publishing Year	2004
Title	Guide F: Energy Efficiency in Buildings
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287340

Course Material	Book
Author	CIBSE
Publishing Year	2006
Title	Comfort
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287677

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

Course Material	Book
Author	Mitchell, S. & Race, G.L.
Publishing Year	2003
Title	Practical Guide to HVAC Building Services Calculations
Subtitle	
Edition	
Publisher	BSRIA
ISBN	0860226182

Course Material	Book
Author	Bownass, D.
Publishing Year	2000
Title	Building Services Design Methodology
Subtitle	
Edition	
Publisher	Spon Press
ISBN	0419252800

Notes

This module is a key component for those students wishing to complete the programme following a 'mechanical' building services pathway. It develops the students' depth of understanding of heating by analysing some of the core concepts and exploring some of the more specialised applications and processes within air conditioning.