

## Liverpool John Moores University

Title: REFRIGERATION APPLICATIONS  
Status: Definitive  
Code: **5606BEFDL** (123943)  
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:** FHEQ5      **Credit Value:** 10      **Total Delivered Hours:** 40  
**Total Learning Hours:** 100      **Private Study:** 60

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	6
Tutorial	10

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Report completed with individual technical report related to the refrigeration cycle	100	

### Aims

*The aim of this module is to further develop the student's understanding of the principles and applications of refrigeration system and the overview of Building Energy Management System.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Analyse and evaluate the principles, application and operational characteristics of refrigeration and heat pump plant and equipment.
- 2 Design cooling and chilled water distribution systems and select and specify appropriate cooling and chilled water plant for air conditioning applications.
- 3 Identify the control and management needs of buildings and the characteristics of Building Management Systems.
- 4 Investigate BMS hardware, functions and applications.

## Learning Outcomes of Assessments

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

REPORT	1	2	3	4
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## Outline Syllabus

*Vapour compression refrigeration cycles: investigation of the major components in refrigeration/heat pump installations. Lubrication requirements and principles. Sizing and selection of refrigeration, ground and air source heat pump plant. Control systems for refrigeration and heat pump systems*

*Refrigerant properties: performance, health & safety and environmental implications of commercially available refrigerants. Legislation and standards, handling and disposal of refrigerants Criteria for selection. Procedures for charging and evacuating systems. Leak detection in refrigeration systems.*

*Refrigeration plant performance: thermodynamics, operational features and application of vapour compression, absorption, evaporative and other refrigeration cycles and processes.*

*Practical and performance characteristics of: various refrigeration cycles, refrigerants, compressors, condensers and evaporators.*

*Design of cooling processes for air conditioning applications: determination of plant loads, safety and operating controls, VRF systems; plant configuration, operational characteristics, applications and limitations.*

*Chilled water Installations: types of chiller, plant arrangements, use of ground and air source heat pumps within chilled water networks, use of buffer vessels, pumping arrangements, design of chilled water networks. Selection and specification of refrigeration and chilled water plant and equipment.*

*Commissioning: testing requirements.*

*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.*

## **Learning Activities**

Lectures, tutorials, and laboratory work.

## **Notes**

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

This module also overview the Building Management System which is the vital parts of the functionality of Building Services Engineering System.