

## Liverpool John Moores University

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Title: VENTILATION AND AIR CONDITIONING B  
Status: Definitive  
Code: **5005BEFD** (108467)  
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
Practical	7.000
Tutorial	12.000

**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	40.0	
Report	AS3	Practical based assignment	10.0	

### Aims

*To further develop the student's understanding of the principles and applications of ventilation and air conditioning by adding depth and breadth to previous studies. Depth is provided by more detailed consideration of the thermal performance of the building envelope and consideration of the performance of refrigeration plant.*

*Breadth is provided by the investigation of some of the more specialised aspects of ventilation and air conditioning such as smoke ventilation, high velocity systems and some of the larger multi-zone air conditioning systems.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Determine energy requirements using data related to climate, building envelope, occupancy and use.
- 2 Produce designs for fire and smoke management ventilation systems in buildings.
- 3 Design large multi-zone air conditioning systems for complex commercial/industrial buildings.
- 4 Investigate the engineering, economic and design factors relating to the use of high pressure/velocity air distribution systems.
- 5 Analyse and evaluate the operation and application of refrigeration and chilled water distribution systems within air conditioning applications.

## **Learning Outcomes of Assessments**

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

EXAM	2	3	4	5	
PROJECT	1	2	3	4	5
PRACTICAL	5				

## **Outline Syllabus**

*Seasonal climatic variations: use of weather data.*

*Operating characteristics: building, occupation times, system type,*

*Heat gain and loss data: operating profiles for occupancy movement, lighting, machinery/equipment, infiltration/ventilation, etc.*

*Loadings: heating and cooling loads, diversity for central cooling plant, use of thermal analysis /simulation software.*

*Ventilation requirements of buildings: ventilation systems for fire/smoke control.*

*Commissioning and testing requirements: setting systems to work, commissioning and testing.*

*Air conditioning: systems for large complex commercial and industrial applications, heat recovery and waste minimisation, filtration of contaminants, control system requirements, simulation of building/system performance.*

*Ductwork distribution networks: Design of high velocity systems, economic and engineering factors, attenuation requirements. Sizing high velocity systems, static regain method of duct sizing. Selecting fans.*

*Refrigeration plant performance: vapour compression, absorption and other refrigeration cycles*

*Practical and operating characteristics: refrigerants, compressors, condensers, evaporators*

*Design characteristics: determination of plant loads, safety and operating controls.  
 Commissioning: testing requirements.  
 Chilled water installations: plant requirements, design of chilled water networks.*

## Learning Activities

Lectures, tutorials, case studies, site visits.

## References

<b>Course Material</b>	Book
<b>Author</b>	Chadderton, D.V.
<b>Publishing Year</b>	1997
<b>Title</b>	Air Conditioning - A Practical Introduction
<b>Subtitle</b>	
<b>Edition</b>	2nd Edition
<b>Publisher</b>	E&F Spon
<b>ISBN</b>	0419226109

<b>Course Material</b>	Book
<b>Author</b>	Jone, W.P.
<b>Publishing Year</b>	1997
<b>Title</b>	Air Conditioning Applications and Design
<b>Subtitle</b>	
<b>Edition</b>	2nd Edition
<b>Publisher</b>	Arnold
<b>ISBN</b>	0340645547

<b>Course Material</b>	Book
<b>Author</b>	Jones, W.P.
<b>Publishing Year</b>	2001
<b>Title</b>	Air Conditioning Engineering
<b>Subtitle</b>	
<b>Edition</b>	5th Edition
<b>Publisher</b>	Butterworth-Heinemann
<b>ISBN</b>	0750650745

<b>Course Material</b>	Book
<b>Author</b>	Eastop, T.D. & Watson, W.
<b>Publishing Year</b>	1992
<b>Title</b>	Mechanical Services for Buildings
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	Longman

<b>ISBN</b>	0582056954
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<b>Course Material</b>	Book
<b>Author</b>	CIBSE
<b>Publishing Year</b>	2001
<b>Title</b>	Guide B2 Ventilation and Air Conditioning
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	CIBSE
<b>ISBN</b>	1903287162

<b>Course Material</b>	Book
<b>Author</b>	CIBSE
<b>Publishing Year</b>	2006
<b>Title</b>	Guide A: Environmental Design
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	CIBSE
<b>ISBN</b>	1903287669

<b>Course Material</b>	Book
<b>Author</b>	CIBSE
<b>Publishing Year</b>	2005
<b>Title</b>	Guide B3: Ductwork
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	CIBSE
<b>ISBN</b>	1903287200

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

<b>Course Material</b>	Book
<b>Author</b>	CIBSE
<b>Publishing Year</b>	2006
<b>Title</b>	Comfort
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	CIBSE
<b>ISBN</b>	1903287677

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

<b>Course Material</b>	Book
<b>Author</b>	Shepherd, K.
<b>Publishing Year</b>	1999
<b>Title</b>	Variable Air Volume Air Conditioning Systems
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	Blackwell Science
<b>ISBN</b>	0632042761

<b>Course Material</b>	Book
<b>Author</b>	Jackman, P.J.
<b>Publishing Year</b>	0
<b>Title</b>	Design Recommendations for Room Air Distribution Systems
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	BSRIA
<b>ISBN</b>	0860222527

<b>Course Material</b>	Book
<b>Author</b>	Abbas, T.
<b>Publishing Year</b>	1999
<b>Title</b>	Displacement Ventilation & Static Cooling Systems
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	BSRIA
<b>ISBN</b>	0860225364

<b>Course Material</b>	Book
<b>Author</b>	CIBSE
<b>Publishing Year</b>	2002
<b>Title</b>	Displacement Ventilation in Non Industrial Buildings
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	CIBSE
<b>ISBN</b>	0825942363

<b>Course Material</b>	Book
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<b>Author</b>	Awbi, H.
<b>Publishing Year</b>	2003
<b>Title</b>	Ventilation of Buildings
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	Spon Press
<b>ISBN</b>	0415270561

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## 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 air conditioning by analysing some of the core concepts and exploring some of the more specialised applications and processes within air conditioning.