

# Building Services I

## Module Information

2022.01, Approved

### Summary Information

Module Code	4504ICBTBS
Formal Module Title	Building Services I
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	15
Academic level	FHEQ Level 4
Grading Schema	40

### Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

### Partner Teaching Institution

Institution Name
International College of Business and Technology

### Learning Methods

Learning Method Type	Hours
Lecture	45
Tutorial	15
Workshop	10

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-PAR	PAR	January	12 Weeks

## Aims and Outcomes

Aims	This module introduces the fundamental concepts and principles of refrigeration, HVAC, Electronics and Electricity, lighting system, and the application of these to engineering problems in the built environment.
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**After completing the module the student should be able to:**

### Learning Outcomes

Code	Number	Description
MLO1	1	Demonstrate an understanding of refrigeration effect, different methods of refrigeration, types of refrigerants, and characteristics of refrigerants.
MLO2	2	Apply basic principles of Air Conditioning and ventilation, heat gain and heat loss calculations for building heating/cooling load estimation, air conditioning systems, air distribution systems and their applications.
MLO3	3	Apply DC and AC theory, test equipment and circuit design, wiring systems and related safety.
MLO4	4	Demonstrate an understanding of the lighting system in buildings.

## Module Content

Outline Syllabus	<p>Refrigeration: Simple Vapour Compression Refrigeration, Evaporating &amp; Condensing temperatures, Maintaining the Constant Mass flow in Evaporator, p-h charts for Refrigerants, Simple Saturated Cycle, Analysis of Vapour Compression Refrigeration Cycle, Effect of Suction Temperature and Condensing Temperature on Cycle Performance, Actual Refrigeration Cycle, Effect of sub-cooling, super heating, Effect of Pressure Losses, Liquid Suction Heat Exchangers. Properties of Common Refrigerants, Requirement for Refrigerants, Identification of Refrigerants by Coding Number, Classification of Refrigerants, Miscellaneous Properties, Heat Transfer characteristics comparison of the Refrigerants, Refrigerant Selection, Brine Solution.</p> <p>HVAC System: Introduction to Ventilation Systems: Basic need for building ventilation, threshold limits of internal contaminants, Natural ventilation and Mechanical ventilation, air flow around buildings. Methods of Ventilation: Natural, wind effect, stack effect, combined effect; Mechanical, forced, exhaust, combined displacement ventilation methods.</p> <p>Air Conditioning: Purpose of air conditioning and definitions, types of air-conditioners, system components of HVAC systems. Psychometric of Air &amp; Air Conditioning Processes: Properties of moist air: Gibbs Dalton law, Specific humidity, Dew Point temperature, Degree of Saturation, Relative Humidity, Enthalpy, Humid Specific Heat, Wet Bulb temp, Thermodynamics Wet Bulb temp; Psychometric Chart, Psychometry of air-conditioning processes, Mixing Process, Basic processes in conditioning of air, Psychometric processes in air washer.</p> <p>Air Conditioning Load Calculations: Outside and inside design conditions; Sources of heating load; Sources of cooling load; Heat transfer through structure: Solar radiation, Electrical applications, Infiltration and ventilation, Heat generation inside conditioned space; Difference between Heat Gain and Cooling Load; Apparatus selection; Comfort chart.</p> <p>Air Conditioning Systems: Unitary systems: Window type, Split type; Package systems; Central systems.</p> <p>Air Distribution Systems: Single Duct Single Zone, Single Duct Multi Zone Constant Air Volume (CAV), Variable Air Volume (VAV): Terminal box, Parallel fan, Serial fan.</p> <p>Codes and standards: Codes and standards along with regulations (if available), safety precautionary.</p> <p>Electronics and Electricity: Electrons and Electricity: Introduction, Atoms and their structure, electrical charge, Atomic number, Atomic weight, conductors and insulators, electric current, electric voltage, batteries, wet cells, dry cells. Resistance and Ohm's law: Introduction, Ohm's law, resistors, colour coding of resistors, types of fixed resistors, variable resistors, combination of resistors, series resistances, parallel resistances.</p> <p>3. Kirchhoff's Laws: Introduction, Kirchhoff's voltage laws, Loops, Loop current's Sign conventions, Kirchhoff's voltage law in action, Kirchhoff's current law, Nodes, Kirchhoff's current law in action.</p> <p>Codes and standards: Codes and standards along with regulations (if available), safety precautionary.</p> <p>Lighting System: Introduction to Lighting: Nature and characteristics of light; Aspects of Lighting: importance, applications, key elements; Light Source Terms &amp; Definitions/Photometric units: Solid Angle, Spectral Power Density, Human Eye Sensitivity Curve, Luminous Flux, Luminous Efficacy, Luminous Intensity and Polar Curves, Illuminance and Inverse Squ</p>
Module Overview	
Additional Information	

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Practical	40	0	MLO1, MLO2, MLO3, MLO4
Exam	Written Examination	60	2	MLO1, MLO2, MLO3, MLO4

## Module Contacts

### Module Leader

Contact Name	Applies to all offerings	Offerings
Alison Cotgrave	Yes	N/A

### Partner Module Team

Contact Name	Applies to all offerings	Offerings
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