

## Liverpool John Moores University

Title: BUILDING SERVICES II  
Status: Definitive  
Code: **5500ICBTBS** (126985)  
Version Start Date: 01-08-2021

Owning School/Faculty: Civil Engineering and Built Environment  
Teaching School/Faculty: ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

**Academic Level:** FHEQ5  
**Credit Value:** 15  
**Total Delivered Hours:** 68  
**Total Learning Hours:** 150  
**Private Study:** 82

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	45
Off Site	6
Tutorial	15

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Essay	AS2	Assignment	30	

### Aims

*This module introduces the fundamental concepts and principles of pumps, water supply systems, waste water and sanitary conveyance systems and the application of these to engineering problems in the built environment.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Recognise the pumping system, fans and blowers.
- 2 Describe the function, operation of pumps and pumping systems, fans and blowers and compressors and compressed air systems.
- 3 Describe the basics of water supply systems, operation and maintenance of water supply systems.
- 4 Describe the basics of waste water and sanitary conveyance systems.

## Learning Outcomes of Assessments

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

Examination	2	4
Assignment	1	3

## Outline Syllabus

### *Pumps and Pumping Systems*

*Introduction to pumps; Pump classification: positive displacement pumps - working principle, components; dynamic pumps - working principle, components;*

*Pumping system characteristics : Centrifugal pumps - resistance of the system, pump performance curves, pump best operating point, pump suction performance (NPSH);*

*Assessment of pumps: pump performance evaluation, difficulties in pump assessment;*

*Energy efficiency aspects: pump selection, start/stop control of pump, flow rate control through speed variation, using variable speed drives (VSD), pumps in parallel to meet varying demand, Impeller trimming;*

### *Fans and Blowers*

*Introduction to Fans and Blowers; Classification of fans: Centrifugal fans, Axial fans; Characteristics of Centrifugal and Axial fans;*

*Classification of blowers: Centrifugal blowers, Positive-displacement blowers; Fan laws;*

*Assessment of fans and blowers: fan efficiency, fan performance, Methodology of fan performance assessment, Difficulties in assessing the performance of fans and blowers;*

*Energy efficiency aspect: Fan selection, Reducing system resistance, Best Efficiency Point (BEP), Controlling fan air flow; Related maintenance;*

### *Compressors and Compressed Air Systems*

*Introduction: Components of Compressed Air Systems;*

*Classification of compressors: Positive displacement compressor - Reciprocating and Rotary compressors; Dynamic Compressors;*

*Assessment of compressors and compressed air systems: Capacity of compressor Compressor Efficiency - Isothermal efficiency, Volumetric efficiency;*

*Performance Assessment of Distribution Losses In the compressed air system - Pressure losses, Leak quantification;*

*Energy efficiency aspect: Location of Compressor, Air intake temperature, Pressure drops, Elevation,*

*Inter and After-Coolers; Pressure setting - Reducing delivery pressure, Compressor modulation by optimum pressure setting, Minimizing leakage, Condensate removal;*

*Components of Water Supply System*

*Sources of water, water treatment, water supply mechanisms, storage facilities, water distribution*

*Basics on Planning and Estimating Components of Water Supply*

*Basic Planning Principles of Water Supply System, Calculate Daily requirement of Water, Estimate Components of Water Supply System*

*Basics on Water Pumping and Distribution*

*Basics on Water Pumping, Pipeline Distribution Networks, Type of Pipe Materials, Type of Valves for Water Flow Control, Types of Pipe Fittings, Basics About Laying of Distribution Pipelines, Installation of Water Meters, Regulatory Requirements Wastewater Collection*

*Wastewater Collection Systems, Regulatory Requirements, Design and Construction of Collection Systems,*

*Storm water management*

*Storm water management systems, regulatory requirements, design and construction of collection systems*

## **Learning Activities**

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

By a series of lectures and theoretical approach together with numerous tutorials Workshops and occasional site visits will be organised to provide the hands on experience for the students regarding the electrical systems of buildings.

A recommended resource list - indicating key reading, virtual and physical learning assistance, is provided to help enable students to undertake self-directed study.

## **Notes**

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