

## Liverpool John Moores University

Title: BUILDINGS, ENERGY AND SUSTAINABILITY  
Status: Definitive  
Code: **6502ICBTBS** (127100)  
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:** FHEQ6  
**Credit Value:** 20  
**Total Delivered Hours:** 42  
**Total Learning Hours:** 200  
**Private Study:** 158

### Delivery Options

Course typically offered: Semester 2

| Component | Contact Hours |
|-----------|---------------|
| Lecture   | 20            |
| Tutorial  | 20            |

**Grading Basis:** 40 %

### Assessment Details

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|----------|-------------------|-------------|---------------|---------------|
| Report   | AS1               | REPORT      | 50            |               |
| Exam     | AS2               | EXAMINATION | 50            | 2             |

### Aims

*To investigate the environmental consequences of energy use in buildings with particular reference to building engineering systems and services.*

*To critically evaluate the environmental and economic benefits which are consequent on the specification of various building engineering systems and appropriate low and near zero carbon technologies.*

*To examine processes for the assessment of building energy loads at feasibility and post construction stages.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Evaluate the practicality, appropriateness and energy use implications of various types of building engineering systems which are used to control the internal environments of buildings.
- 2 Evaluate the practicality of various low and zero carbon technologies in different construction scenarios.
- 3 Investigate strategies for obtaining optimum building performance by passive means.
- 4 Critically examine the energy and environmental performance rating of buildings and make comparisons with established performance indicators and targets.
- 5 Investigate processes for waste heat recovery in building systems and energy generation plant.

## **Learning Outcomes of Assessments**

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

|             |   |   |   |
|-------------|---|---|---|
| REPORT      | 1 | 2 | 3 |
| EXAMINATION | 3 | 4 | 5 |

## **Outline Syllabus**

*Analysis of the role of building engineering professionals in meeting the objectives of the climate change programme.*

*Evaluation of energy sources, both conventional and alternative, and their implications for practical sustainability. This involves an analysis of economic and carbon factors, and sustainability issues in a building services engineering context.*

*Evaluation of the applications for individual low and zero technologies in (or supplying) buildings. These include active and passive solar energy for heating and hot water, photovoltaics, hydro-electric power, wind power, bio-mass energy, combined heat and power, heat pumps, use of ground-water as an energy medium, and rain water harvesting for use in grey water schemes.*

*Analysis of Energy efficient design*

*Electrical (power, lighting and cooling) and fossil (heating) energy efficient solutions for maintaining the internal environments within buildings. Analysis of the optimum levels of conventional and renewable technologies together with opportunities for energy recovery and cooling/heating load reduction. This includes an analysis of design techniques for inherent commission- ability and facilities management.*

*Analysis of Energy Audit and Performance Rating applications: Determining the energy utilisation, performance and running costs for commercial buildings. Assessing the energy and CO2 performance of buildings and their services against legislative requirements, energy performance indicators and benchmarks.*

## **Learning Activities**

Lectures and tutorials, occasional site visits,

## **Notes**

The module provides an understanding of the environmental consequences of energy use in general and via building services installations in particular. It also provides the knowledge and skills to critically evaluate the environmental and economic benefits of various strategies and technologies for reducing the energy usage and environmental impact of building engineering systems.