# Digital Electronics

# Module Information

**2022.01, Approved**

## Summary Information

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|---|---|
| Module Code | 4502ICBTEL |
| Formal Module Title | Digital Electronics |
| Owning School | Engineering |
| 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 | 30 |
| Practical | 15 |
| Tutorial | 15 |

## Module Offering(s)

| Display Name | Location | Start Month | Duration Number Duration Unit |
|---|---|---|---|
| APR-PAR | PAR | April | 12 Weeks |

| | | | |
|---|---|---|---|
| JAN-PAR | PAR | January | 12 Weeks |
| SEP-PAR | PAR | September | 12 Weeks |

## Aims and Outcomes

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| Aims | The module educates the basic understanding in both the art and science of digital electronic circuit engineering.The module explores the relationship and application of digital electronic circuit design as a supporting and enabling technology for other disciplines.The module helps to develop students' confidence in the design and critical analysis of logic and digital electronic circuits design.This module use to build students' competence in the characterization of electronic circuits using appropriate laboratory equipment and methodological approaches. |

**After completing the module the student should be able to:**

**Learning Outcomes**

| Code | Number | Description |
|---|---|---|
| MLO1 | 1 | Demonstrate the use of digital electronics in the modern electronics and digital IC characteristics. |
| MLO2 | 2 | Explain the operation of logic gates and logic circuits and design combinational logic circuits from truth tables using Boolean algebra and truth tables. |
| MLO3 | 3 | Explain the operation of sequential logic and apply FSM design techniques (Mealy/Moore) to develop sequential logic design. |
| MLO4 | 4 | Demonstrate digital electronic design process and application for combinational and sequential logic in the laboratory with the use of computer simulation software and laboratory equipment's. |

## Module Content

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|---|---|
| Outline Syllabus | Review the digital signals over analogue signals and use of digital signals in the modern architecture.Review the IC characteristics for CMOS and TTL include voltage in/out, propagation delay, slew rate by using appropriate manufacture datasheet. Explain the operation of digital logic gates, and design process of combinational logic circuits using by using truth tables, Boolean algebra and Karnaugh maps to design the gate level design.Using combinational logic design process develop and design the gate level logic for Adders/subtraction, mux/de-mux, encoder/decoder.Design the circuit by using Decoder/Encoder, Mux/De-mux.Explain the operation of sequential logic circuit by using digital clock to make understand the operation of flip flop and latches.Design a digital circuit using sequential logics such as counters and registers by using synchronous and asynchronous timing diagram.Introduced to FSM methods Moore and mealy model and design a digital circuit by using 4 to 6 states. Applications such as pattern recognition, elevators, traffic lights.Explain the operation of basic computer (E.g. 8088 microprocessor) include ALU registers buses and memory by using the concept of combinational and sequential logic. Explain the concepts of von Neumann and Harvard architecture in the microprocessor architecture.Use of software package (i.e. OrCAD/pspise or similar industrial based software) to simulate the logic gate circuits / combinational circuits / sequential circuits / Digital electronic application such as traffic lights.Design and demonstrate the simulated circuits in the laboratory by using appropriate IC's and equipment. |
| Module Overview | |
| Additional Information | |

## Assessments

| Assignment Category | Assessment Name | Weight | Exam/Test Length (hours) | Module Learning Outcome Mapping |
|---|---|---|---|---|

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|---|---|---|---|---|
| Portfolio | Portfolio | 30 | 0 | MLO4 |
| Exam | Exam | 70 | 2 | MLO1, MLO2, MLO3 |

## Module Contacts

**Module Leader**

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|
| Karl Jones | Yes | N/A |

**Partner Module Team**

| Contact Name | Applies to all offerings | Offerings |
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