# Module Proforma

**Approved, 2022.01**

## Summary Information

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|---|---|
| **Module Code** | 4523USST |
| **Formal Module Title** | Digital Electronics |
| **Owning School** | Engineering |
| **Career** | Undergraduate |
| **Credits** | 20 |
| **Academic level** | FHEQ Level 4 |
| **Grading Schema** | 40 |

## Module Contacts

### Module Leader

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|
| Dante Matellini | Yes | N/A |

### Module Team Member

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|

### Partner Module Team

| Contact Name | Applies to all offerings | Offerings |
|---|---|---|

## Teaching Responsibility

| LJMU Schools involved in Delivery |
|---|
| LJMU Partner Taught |

## Partner Teaching Institution

| Institution Name |
| --- |
| University of Shanghai For Science and Technology |

## Learning Methods

| Learning Method Type | Hours |
| --- | --- |
| Lecture | 22 |
| Practical | 11 |
| Tutorial | 11 |

## Module Offering(s)

| Offering Code | Location | Start Month | Duration |
| --- | --- | --- | --- |
| SEP-PAR | PAR | September | 12 Weeks |

## Aims and Outcomes

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| --- | --- |
| **Aims** | To provide an introduction to Boolean Logic and the operation of combinational and sequential digital logic circuits. |

## Learning Outcomes

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

| Code | Description |
| --- | --- |
| MLO1 | Understand the principles of Boolean logic and algorithms. |
| MLO2 | Examine electronics through analyzing and designing basic combinational digital circuits. |
| MLO3 | Identify sequential digital circuits and applications. |
| MLO4 | Apply the knowledge in digital electronic circuit design |

## Module Content

| Outline Syllabus |
| --- |
| Logic Gates and Functions, DeMorgan's Theorems and gate equivalence.<br>Combinational Logic and Boolean Algebra' Boolean expression from logic diagrams and truth tables, truth tables from logic diagrams and Boolean expressions, commutative, associative and distributive properties, loading Karnaugh map from a<br>truth table, multiple and overlapping groups.<br>Applications of Karnaugh map: multiple output networks, decoders, code conversion network.<br>Digital logic and combinational circuits Latches and Flip-Flops: SR latch, Latches as contact-bounce eliminators, Edge triggered SR, D-type, J-K Flip-Flops.<br>Digital Counters: asynchronous and synchronous counters concept, Counter design using S-R/JK/D-type flip-flops.<br>Shift Registers: serial shift registers, serial in-parallel out shift registers, bidirectional shift registers.<br>Sequential circuits design.<br>Use CAD tools to carry out circuit design and simulation. |

**Module Overview**

| Additional Information |
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| This Level 4 module is devised for students to gain fundamental knowledge and practical skills in digital electronics circuit analysis and design.<br>General Notes<br>UNESCO Sustainable Development Goals<br>Quality Education<br>Gender Equality<br>Industry, Innovation and Infrastructure<br>Sustainable Cities and Communities<br>Climate Action<br>Partnerships for the Goals<br>UK SPEC AHEP 4<br>CEng.<br>M8 Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.<br>M11 Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.<br>M13 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.<br>IEng.<br>B1 Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.<br>B2 Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.<br>B3 Select and apply appropriate computational and analytical techniques to model broadly-defined problems, recognising the limitations of the techniques employed.<br>B4 Select and evaluate technical literature and other sources of information to address broadly-defined problems.<br>B5 Design solutions for broadly-defined problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal,<br>environmental and commercial matters, codes of practice and industry standards.<br>B6 Apply an integrated or systems approach to the solution of broadly-defined problems.<br>B12 Use practical laboratory and workshop skills to investigate broadly-defined problems.<br>B13 Select and apply appropriate materials, equipment, engineering technologies and processes. |

## Assessments

| Assignment Category | Assessment Name | Weight | Exam/Test Length (hours) | Learning Outcome Mapping |
| --- | --- | --- | --- | --- |
| Portfolio | Portfolio | 30 | 0 | MLO1, MLO2, MLO3, MLO4 |
| Exam | Exam | 70 | 2 | MLO1, MLO2, MLO3, MLO4 |