<table>
<tr><td>1.</td><td colspan="5">Name of Course</td><td colspan="2">Digital Systems</td></tr>
<tr><td>2.</td><td colspan="5">Course Code</td><td colspan="2">CCPS1573</td></tr>
<tr><td>3.</td><td colspan="5">Name(s) of academic staff</td><td colspan="2"></td></tr>
<tr><td>4.</td><td colspan="5">Rationale for the inclusion of the course/module in the programme</td><td colspan="2">Faculty<br>This module provides foundation knowledge which is necessary for the understanding of other modules such as CCP0102 Computer Architecture. It is therefore imperative that student of computer related fields are offered the opportunity to gain experience of design and implementation of simple circuits and understand the principle of computer hardware.</td></tr>
<tr><td>5.</td><td colspan="5">Semester and Year offered</td><td colspan="2">1/1</td></tr>
<tr><td rowspan="3">6.</td><td rowspan="2">Total Student Learning Time (SLT)</td><td colspan="4">Face to Face</td><td rowspan="2">Total Guided and Independent Learning</td></tr>
<tr><td rowspan="2">L = Lecture<br>T = Tutorial<br>P = Practical<br>O= Others</td><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td>28</td><td></td><td>28</td><td></td><td>Independent = 84<br>Total =140</td></tr>
<tr><td>7.</td><td colspan="5">Credit Value</td><td colspan="2">3</td></tr>
<tr><td>8.</td><td colspan="5">Prerequisite (if any)</td><td colspan="2">None</td></tr>
<tr><td>9.</td><td colspan="7">Objectives:<br>• To familiarise the student with binary and hexadecimal number system.<br>• To familiarise the student with the fundamental operation of digital circuit elements.<br>• To introduce the fundamental concepts of logic design of digital circuits.<br>• To introduce digital circuit design at the combinatorial and simple sequential level.</td></tr>
<tr><td>10.</td><td colspan="7">Learning outcomes:<br><br>After completing this subject, it is expected that students will able to:<br>• Explain the fundamentals of digital circuit logic elements, various logical operations and design of logic circuits.<br>• Explain the functionalities of basic building blocks of a microcomputer.<br>• Utilise laboratory equipment and their documented laboratory work to perform exercises in a manner consistent with good computing practice.<br>• Undertake relevant analysis of simple electronic circuits.</td></tr>
<tr><td>11.</td><td colspan="7">Transferable Skills:<br>• Be aware of the fundamentals of logic design of digital circuits.<br>• Familiarise with binary and hexadecimal number system.<br>• Familiarise with basic analogue and digital electronics and develop circuit analysis skills.<br>• Take a generic, systematic approach to solving system problems</td></tr>
</table>

12. **Teaching-learning and assessment strategy**

A variety of teaching and learning strategies are used throughout the course, including:

- Classroom lessons: Lectures and Power Point presentations
- Laboratory sessions: Practice exercises
- brainstorming;
- student-Lecturer discussion
- collaborative and co-operative learning;
- Independent study.

Assessment strategies include the following:

- Ongoing quizzes
- Midterm tests
- Performance Assessment (project, Assigned exercises)
- Lecturer Observation

13. **Synopsis:**

The course introduces for expose student to the field of Digital technology elements such as Logic elements, Counters and registers and etc.

14. **Mode of Delivery:**

- Classroom lessons. Lectures and Power Point presentations
- Laboratory sessions: Practice exercises

15. **Assessment Methods and Types:**

The assessment for this course will be based on the following:

| | | |
|---|---|---|
| | **Coursework** | **50%** |
| • Quizzes | 15% | |
| • assignments | 15% | |
| • Mid-Semester Exam | 20% | |
| | **Final Exam** | **50%** |
| | | 100% |

16. **Mapping of the course/module to the Programme Aims**

| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 |
|---|---|---|---|---|---|---|---|---|
| 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |

17. **Mapping of the course/module to the Programme Learning Outcomes**

| LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 | LO9 | LO10 | LO11 | LO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 2 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 0 |

18. **Content outline of the course/module and the SLT per topic**

| | Details | SLT | | | |
|---|---|---|---|---|---|
| | | L | P | Indep. | Total |
| **Topic 1** | **Introduction**<br>Digital and Analog Systems. Number Systems, Binary/Octal/Hex Number Systems .Binary Arithmetic. Other Codes: BCD, Excess-3, Gray, ASCII. | 2 | 2 | 6 | 10 |
| **Topic 2** | **Logic Elements**<br>Logic operators. Symbols, Logic Gates, Truth tables, Evaluation of logic circuit output , Gate level circuit, TTL, Boolean Algebra Boolean & DeMorgan's Theorems. NAND and NOR gates. | 4 | 4 | 12 | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Topic 3** | **Combination Logic Circuit**<br>Sum-of-Product&Product-of-Sum, Simplification of Logic Circuit .Designing Combinational Logic. K-Map, Basic characteristics of Digital ICS. XOR and XNOR circuits, and Parity generator. | 4 | 4 | 12 | 20 |
| | **Topic 4** | **Sequential Logic.**<br>Delays & Latches, Clock signal, JK & Flip- flops.D flip –flops, Timing & State, Asynchronous inputs, Master/slave flip-flop, Flip-flop synchronisation and application. Monostable and astable multivibrators. | 3 | 3 | 9 | 15 |
| | **Topic 5** | **Arithmetic Circuits.**<br>Signed numbers.2's complement, Addition & subtraction, Multiplications and Division, BCD Addition, Half & Full Adder, Parallel/Aerial Adder and Carry propation. | 3 | 3 | 9 | 15 |
| | **Topic 6** | **MSI Logic circuits**<br>Decoder/Encoder, 7 – Segment drivers, Multiplexer & Demultiplexer, Code Converter & Comparators and Tristate register. | 3 | 3 | 9 | 15 |
| | **Topic 7** | **Counters and Register**<br>Synchronous/Asynchronous counters. Up/down counters, Design counters, Shift register Parallel & series load). Counter / Shift register ICs<br>and Counter/Shift applications | 3 | 3 | 9 | 15 |
| | **Topic 8** | **IC logic families**<br>TTL/CMOS/ECL Characteristics, Loading & Fan-out, Open Collectors & Open drain and Tristate TTL | 2 | 2 | 6 | 10 |
| | **Topic 9** | **Interfacing with analogue devices**<br>DAC &ADC, Converter circuits and Digital-ramp ADC. | 2 | 2 | 6 | 10 |
| | **Topic 10** | **Memory Devices**<br>Memory Architecture, Memory Operations, CPU-memory Connection, ROM/RAM/EPROM And Read/Write Cycle. | 2 | 2 | 6 | 10 |
| | | Total | 28 | 28 | 84 | 140 |
| | **Laboratory** | Laboratory Details<br>Exercises based on topics covered in each lecture. Experimental work must include the following<br>• Introduction to basic tools (breadboard, oscilloscope, IC tester, etc.)<br>• Build simple circuits using basic gates<br>• design & implement combinational logic circuits<br>• Implement flip-flops<br>• Design & implement couters and shiftregisters<br>• Design & implement Arithmetic circuits & Arithmetic ICs<br>• Design & implement decoder/encoders<br>• Simple projects | | | | |
| 19. | **Main references supporting the course:**<br>Thomas L. Floyd, "**Digital Fundame**ntal**s**" 10th Edition, Pearson Education International, 2008. | | | | | |
| | **Additional references supporting the course:**<br>1. M.Moris Mano and Michael D. Ciletti, **"Digital Design"**, 4th Edition, 2007, Prentice hall.<br>2. Ronald J. Tocci, Neal S.Wldmer, and Gregory L.Moss, **"Digital Systems : Principles and Application"**, 10th Edition, Pearson education International, 2007 | | | | | |

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|---|---|
| 20. | **Other additional information**<br>All materials will be available to the students online. |