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***Leader in Innovative Technology***

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**FACULTY OF COMPUTING & INFORMATION TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSE OUTLINE**

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| **Code & Name** | CCS 2215 / BCT 2206: DIGITAL ELECTRONICS |
| **Prerequisite** | *ICS 2200 Analogue Electronics* |
| **Cohort** | BIT 2016 |
| **Lecturer** | Gakinya D |
| **Contact** | [dkgakinya@yahoo.com](mailto:dkgakinya@yahoo.com); Tel. 0722 888010 |

**Purpose**

This course aims at enabling students to differentiate the construction, types, uses and perform basic calculation for the following; gates, combinational logic and sequential logic.

**Learning outcomes**

At the end of the course students should be able to:

i. Demonstrate the use of the different devices in computer hardware design

ii. Use logic gates to design combinational and sequential circuits

iii. Discuss the construction and operation of counters and registers.

**Course Description**

Number systems: decimal, binary, hexadecimal. Conversion from one number system to another. Codes; BCD, ASCII. Applications of codes. Signal; analogue, digital, logic levels; logic gates; AND, OR, INVERTER. Truth tables, Boolean Algebra, Karnaugh Maps, Logic circuits; Standard gate symbols; combinational logic, Universal gates; NAND, NOR, EXOR. ICs and applications. Basic Digital Electronic Devices: Counters; Flip flops; S-R, D, Latches, J-K. Binary counters; parallel, serial. Decade counter. Encoder and decoders. Multiplexers and demultiplexers. Displays: LEDs, LCDs 7 segment display. Memory: Terminology; Bit, Byte, Word Nibble, data address. Registers, RAM, ROM, EPROM, EEPROM. Signal conditioning: transducers, sensors, actuator, and amplifiers/driver circuits.

# Delivery Methodology

Lectures, Question and Answer, Demonstrations, Group discussions, Laboratory Experiments.

individual and group assignments and exercises.

# Learning Resources

LCD projector and computer, handouts, journals, white boards, textbooks. Demonstration Laboratory equipment.

# Course Content

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| **WEEK** | **TOPIC** | **OUTLINE** |
| WK1 | 1. Introduction | Number Systems and Codes  The Design Process for Combinational Systems |
| WK2 | Switching Algebra and Logic Circuits | The Development of Truth Tables; Switching Algebra  Implementation of Functions with AND, OR, and NOT Gates  From the Truth Table to Algebraic Expressions  NAND, NOR, Exclusive-OR and Exclusive NOR Gates |
| WK3 |  | Simplification of Algebraic Expressions  De Morgan’s theorem; Implementation of Functions with NAND and NOR Gates only |
| WK4 | The Karnaugh Map | Minimum Sum of Product Expressions Using the Karnaugh map; Product of Sums; Sum of Products |
| WK5 | The Karnaugh Map | Don’t Cares Conditions  Minimum Cost Gate Implementations  Five-and Six Variable Maps |
| WK6 | CAT1 | CAT1 |
| WK7 | Solving Larger Problems | Delay in Combinational Logic Circuits  Adders, Subtractors |
| WK8 | Solving Larger Problems | Encoders, Decoders, Multiplexers, Demultiplexers, Digital comparators |
| WK9 | Sequential Systems | Latches and Flip Flops  Flip Flop Design Techniques |
| WK10 | Sequential Systems | The Design Process for asynchronous Sequential Systems; Shift Registers**,** Counters |
| WK11 | CAT2 | CAT2 |
| WK12 | Memory | RAM, ROM, EPROM, EEPROM |
| WK13 | Signal conditioning | Transducers, sensors, actuator, and amplifiers/driver circuits. |
| WK14 | Course Review | Course Review |

**Course Assessment**

Continuous Assessment Tests 30%

End of Semester Examination 70%

**Course Textbooks**

1. Floyd T. L Digital Fundamentals, Ninth Ed. (2006) Prentice-Hall International, Inc
2. 2. Roger L. Tokheim (2007), Digital Electronics: Principles and Applications, McGraw-Hill Education, 7th Edition, ISBN: 678-9878
3. Anil Kumar Maini (2007), Digital Electronics: Principles, Devices and Applications, McGraw-Hill, illustrated Edition, ISBN: 987-78676

**Course Journals**

1. Advances in data Analysis and Classification ISSN 1862-5347

2. Annals Of software Engineering ISSN 1022-7091

3. Acta Informatica ISSN 0001-5903

4. Advances in Computational Mathematics ISSN 1019-7168

**Reference Textbooks**

1. Malvino, A. P., Digital Principles and Applications, Tata McGraw-Hill, 1991
2. Alan B. Marcovitz, Introduction to Logic Design, McGraw-Hill, 1st edition, 2002
3. Stephen, B. and Zvonko V (2009), Fundamentals of Digital Logic with VHDL Design.

**Reference Journals**

1. Journal of computer science and Technology ISSN 1000-9000

2. Journal of Science and Technology ISSN 1860-4749

3. Central European Journal Of Computer Science ISSN 1896-1533

4. Cluster computing ISSN 1386-7857

Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_