



# AMITY UNIVERSITY

UTTAR PRADESH

## FORMAT FOR COURSE CURRICULUM

**Course Title:** Digital Design  
**Course Code:** to be decided later...  
**Credit Units:** 3  
**Level:** U.G.

L	T	P/S	SW/FW	No. of PSDA	TOTAL CREDIT UNITS
2	0	2	-	-	3

**Course Objectives:** This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean algebra and Karnaugh Mapping and will be able to draw logic diagrams.

**Prerequisites:** An Introduction to Modern Electronics, Basic Algebra

### Course Contents/Syllabus:

	Weightage (%)
<b>Module- 1: Digital Fundamental</b>	<b>25</b>
Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's, 2's, 9's and 10's complements, Codes – Binary, BCD, Excess 3, Gray, Boolean algebra, Logic gates, implementation of Boolean function using universal gates, Sum of Products and Product of Sum forms, Minterms and Maxterms, Karnaugh map Minimization, QM method.	
<b>Module-2: Combinational Circuits Design</b>	<b>25</b>
Combinational circuits, Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Encoder, Decoder, BCD to 7 segment decoder.	
<b>Module-3: Sequential Circuits</b>	<b>25</b>
Difference between combinational and sequential circuits, Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, flip flop conversions. Counters, Asynchronous and Synchronous Up/Down, Shift registers, Universal Shift Register.	
<b>Module-4 Finite State Machine</b>	<b>25</b>
Introduction, Block diagram of FSM, Difference Between Mealy and Moore Machine, General design process, Moore FSM design, Mealy FSM Design, Sequence detector.	

**Course Learning Outcomes:**

- Student will be able to recognize digital electronic circuit architectures
- Student will be able to apply basic techniques for analyzing digital electronic circuits.
- Student will be able to identify and describe logic gates combination and sequential circuits.
- Student will be able to review of a wide range of digital applications, selecting and critically evaluating suitable implementation methodologies.

**Pedagogy for Course Delivery:**

The course pedagogy will include four quadrant approach i.e. e-content, audio-visual aids, e-tutorial, supplementary material, discussion and explanation of concepts and applications of the topics covered. The course would be covered under theory and laboratory. In addition to assigning small project-based learning, early exposure to hands-on design to enhance the motivation among the students. It incorporates designing of problems, analysis of solutions submitted by the student's groups and how learning objectives were achieved. Continuous evaluation of the students would be covered under quiz, viva etc.

**List of Professional Skill Development Activities (PSDA):NA****Lab/ Practicals details, if applicable:**

- To design half adder, full adder, half subtractor, full subtractor using gates and verify their truth tables.
- To design and verify a 4x1 multiplexer using logic gates.
- To design a BCD to seven segment decoder converter and verify the truth table.
- To design a 4-bit BCD to Gray code converter and verify the truth table.
- To verify the truth table of R-S and J-K flip flops.
- To design and verify D -flip flop using T-flip flop.
- To design a 3-bit asynchronous UP-counter using J-K flip flops verify the truth table.
- To design a 3-bit synchronous Down counter using D flip flops verify the truth table.
- To design a 4-bit parallel in parallel out shift register.
- To design and study a sequence detector for the sequence 101.

**Assessment/ Examination Scheme:**

Theory (L)(%)	Lab/Practical (%)	Total
66.67%	33.33%	100%

**Theory Assessment (L&T):**

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Mid-Term Exam(CT)	Class Quiz	Home Assignment	Attendance	
Weightage (%)	15%	10%	10%	5%	60%

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Lab Assessment (P):**

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	A	PR	LR	V	
Weightage (%)	5%	15%	10%	10%	60%

A: Attendance, PR- Performance, LR – Lab Record, V – Viva. EE- External Exam,

**Text/ References Books:**

- Gregory L. Moss, Neal S. Widmer, Ronald J. Tocci, Digital Systems principles and applications - Principles and Applications 10th Edition.
- Moris Mano : Digital Design, fourth edition Pearson Education India, 2008, ISBN -8131714500, 9788131714508.
- R. P. Jain: Modern Digital Electronics, fourth edition Tata McGraw-Hill Education, 2010 , ISBN 0070669112, 9780070669116.
- Thomas L. Floyd: Digital Fundamentals, 10th edition Pearson Education India, 2011,ISBN 813173448X, 9788131734483.
- Malvino and Leech: Digital Principles & Applications, 7th edition Tata McGraw Hill,1995 ,ISBN 0070141703, 9780070141704.

**Mapping Continuous Evaluation components/PSDA with CLOs**

Course Learning Outcomes Assessment type/PSDA	CLO1 (Student will be able to recognize digital electronic circuit architectures)	CLO2 (Student will be able to apply basic techniques for analyzing digital electronic circuits)	CLO3 (Student will be able to identify and describe logic gates combination and sequential circuits)	CLO4 (Student will be able to review of a wide range of digital applications, selecting and critically evaluating suitable implementation methodologies.
Home Assignment	✓	✓	✓	✓
Class Quiz	✓	✓	✓	✓
Mid Term Exam	✓	✓		
Viva Voce	✓	✓	✓	✓