



COURSE DESCRIPTION FORM

INSTITUTION National University of Computer and Emerging Sciences (NUCES-FAST)
BS(CS)

PROGRAM (S) TO BE EVALUATED

A. Course Description

B.



(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

| | | | | | | |
|---|---|--------------------|---------------|-------------|---------------|---------------|
| Course Code | | | | | | |
| Course Title | Digital Logic Design (DLD) | | | | | |
| Credit Hours | 3+1 | | | | | |
| Prerequisites by Course(s) and Topics | | | | | | |
| Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | Assessment Tools (AT) & Criteria | | | | | |
| | AT | Description | Weight | | | |
| | 1 | Mid Term I and II | 30 | | | |
| | 2 | Assignments | 10 | | | |
| | 3 | Quizzes | 10 | | | |
| | 4 | Final Examination | 50 | | | |
| | AT to CLO Mapping | | | | | |
| | | AT 1 | AT 2 | AT 3 | AT 4 | Weight |
| | CLO 1 | 2 | | | 2 | 4 |
| | CLO 2 | 13 | 3 | 4 | 8 | 28 |
| CLO 3 | 15 | 4 | 3 | 10 | 32 | |
| CLO 4 | | 3 | 3 | 30 | 36 | |
| AT to PLO Mapping | | | | | | |
| | AT1 | AT 2 | AT 3 | AT 4 | Weight | |
| PLO 1 | | | | | | |
| PLO 2 | 15 | 3 | 4 | 10 | 32 | |
| PLO 3 | 15 | 7 | 6 | 40 | 68 | |

| | | | | | | |
|---|--|--|--|--|--|--|
| | PLO 4 | | | | | |
| | PLO 5 | | | | | |
| | PLO 6 | | | | | |
| | PLO 7 | | | | | |
| | PLO 8 | | | | | |
| | PLO 9 | | | | | |
| | PLO 10 | | | | | |
| | PLO 11 | | | | | |
| | PLO 12 | | | | | |
| | | | | | | |
| Course Coordinator | Rabia Tabassum | | | | | |
| URL (if any) | | | | | | |
| Current Catalog Description | The goal of this course is to introduce concepts & tools for the design of digital electronic circuits using sequential and combinational logic to the freshmen computer science students. | | | | | |
| Textbook (or Laboratory Manual for Laboratory Courses) | Digital Fundamentals , 11 th Edition, Floyd and Jain | | | | | |
| Reference Material | <ol style="list-style-type: none"> 1. Digital Systems Principles and Applications 8th Ed, Tocci, Widmer and Moss 2. Digital Design by Moris Mano | | | | | |



| Course Goals | Course Learning Outcomes (CLO) | | | | |
|---|--------------------------------|--|--|-----------------------|------------|
| | Outcomes (CLO) | | Domain | Taxonomy Level | PLO |
| | 1 | Identify and explain fundamental concepts of digital logic design including basic and universal gates, number systems, binary coded system, basic components of combinational and sequence circuits. | Cognitive | 2 | 2 |
| | 2 | Demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronics circuits , including Boolean Algebra and Multi-variable Karnaugh map methods. | Cognitive | 3 | 2 |
| | 3 | Analyze small –scale combinational digital circuits. | Cognitive | 3 | 3 |
| | 4 | Design small-scale combinational and synchronous sequential digital circuit using Boolean Algebra and K-map. | Cognitive | 3 | 3 |
| Relevant Program Learning Outcomes (PLOs): | | | | | |
| | PLO 1 | Computing Knowledge | Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems. | | |
| | PLO 2 | Problem Analysis | Identify, formulate, research literature, and analyse complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences. | | |
| | PLO 3 | Design/Develop Solutions | Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. | | |
| | PLO 4 | Investigation & Experimentation | Conduct investigation of complex computing problems using research based knowledge and research based methods | | |
| | PLO 5 | Modern Tool Usage | Create, select, and apply appropriate techniques, resources and modern computing tools, including prediction and modelling for complex computing problems. | | |



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|--|---------------|--|--|------|-----------|---|---|---|---|---|----|----|----|--|
| | PLO 6 | Society Responsibility | Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to context of complex computing problems. | | | | | | | | | | | |
| | PLO 7 | Environment and Sustainability | Understand and evaluate sustainability and impact of professional computing work and the solution of complex computing problems | | | | | | | | | | | |
| | PLO 8 | Ethics | Apply ethical principles and commit to professional ethics and responsibilities and norms of computing practice. | | | | | | | | | | | |
| | PLO 9 | Individual and Team Work | Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings. | | | | | | | | | | | |
| | PLO 10 | Communication | Communicate effectively on complex computing activities with the computing community and with society at large. | | | | | | | | | | | |
| | PLO 11 | Project Mgmt and Finance | Demonstrate knowledge and understanding of management principles and economic decision making and apply these to one's own work as a member or a team. | | | | | | | | | | | |
| | PLO 12 | Life Long Learning | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes. | | | | | | | | | | | |
| Relation between CLOs and PLOs (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes) | | | | | | | | | | | | | | |
| | | PLOs | | | | | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| CLOs | 1 | | ✓ | | | | | | | | | | | |
| | 2 | | ✓ | | | | | | | | | | | |
| | 3 | | | ✓ | | | | | | | | | | |
| | 4 | | | ✓ | | | | | | | | | | |
| Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction) | Week No. | Course Contents/Topics | Chapter | CLOs | Tools | | | | | | | | | |
| | 1 | Decimal Numbers, Binary Numbers, Decimal-to-Binary Conversion, Binary Arithmetic, Complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed Numbers, Hexadecimal Numbers, Octal Numbers , | 2 | 1 | A1, M1, F | | | | | | | | | |



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|------------------------|---|--|---|---|-------------|
| and one-hour lectures) | | Binary Coded Decimal (BCD), Digital Codes (Gray code with conversion) | | | |
| | | Logic gates, The Inverter, The AND gate, The NAND Gate, The NOR Gate, The Exclusive-OR and Exclusive- NOR Gates | 3 | 2 | A2,Q1,M1,F |
| | 2 | | | | |
| | 3 | Boolean Operations and Expressions, Laws and Rules of Boolean Algebra, DeMorgan's Theorems, | 4 | 2 | A2,M1,F |
| | 4 | Boolean Analysis of Logic Circuits, Logic Simplification Using Boolean Algebra, Standard Forms of Boolean Expressions, Boolean Expressions and Truth Tables. | 4 | 2 | A2,M1,F |
| | | The Karnaugh Map, Karnaugh Map SOP Minimization, Karnaugh Map POS Minimization | 4 | 2 | A2,M1, F |
| | 6 | Mid-Term I | | | |
| | 7 | Basic Combinational Logic Circuits, The Universal Property of NAND and NOR gates, Pulse Waveform Operation | 5 | 3 | A3,M2, F |
| | 8 | Half and Full Adders, Parallel Binary Adders, | 6 | 3 | A3,Q2,M2 ,F |



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|---|----|---|---|---|----------|
| | 9 | Comparators, Decoders, Encoders, | 6 | 3 | A3,M2,F |
| | 10 | Code Converters, Multiplexers, Demultiplexers | 6 | 3 | A3,M2, F |
| | 11 | Mid-Term II | | | |
| | 12 | Latches | 7 | 4 | ,F |
| | 13 | Flip-Flop | 7 | 4 | Q3, F |
| | 14 | Asynchronous Counters, Synchronous Counters, Design of Synchronous Counters | 9 | 4 | Q3, F |
| | 15 | Shift Register Operations, Types of Shift Register Data I/Os, | 8 | 4 | F |
| | 16 | Revision | | | |
| | | Final Examination | | | |
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| Laboratory Projects/Experiments Done in the Course | | | | | |
| Programming Assignments Done in the Course | | | | | |



National Computing Education Accreditation Council
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001-D

| Class Time Spent on (in credit hours) | Theory | Problem Analysis | Solution Design | Social and I |
|---------------------------------------|---|------------------|-----------------|--------------|
| | 30 | 10 | 5 | |
| Oral and Written Communications | : at least __1__ written report of typically __2__ pages and to make __1__ oral presentation typically __10__ minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as technical content, completeness, and accuracy. | | | |

Instructor Name: **Rabia Tabassum**

Instructor Signature

Date 15-01-25