The University of Jordan
School of Engineering
Computer Engineering Department
Fall Term 2025-2026

Course: Digital Logic – 0907231 (3 Cr. – Core Course)

Catalog Data: Number Systems and digital waveforms. Basic gates and logic functions. Boolean algebra, Boolean expressions. Logic minimization techniques. VHDL basics. Design, simulation and synthesis tools for programmable logic devices. Combinational logic building blocks including decoders, encoders, multiplexers, demultiplexers, magnitude comparators. VHDL for combinational circuits. Digital arithmetic, adders, subtractors. VHDL for arithmetic circuits. Basics of sequential circuits. Basic latches and flip-flops. Timing parameters and diagrams. Counters, shift registers. Basic PLDs, CPLDs and FPGAs architectures. VHDL for binary counters and shift registers. State machines. System design with state machines using VHDL. Memory devices and systems including RAM, ROM, FIFO, LIFO and dynamic RAM.

Prerequisites by Course: 1902098 Computer Placement Exam (Pass) or 1932099 Basics of Computing

Prerequisites by Topic: Students are assumed to have had sufficient knowledge pertaining to digital computers and their internal and external components.

Textbook: Logic and Computer Design Fundamentals, M. Morris Mano and Charles R. Kime, 5th edition, Prentice Hall, 2016.

References:

1. Digital Design: Principles and Practices, Fourth Edition. John F. Wakerly. Prentice Hall, Upper Saddle River, NJ, 2006.
2. Digital Design with RTL Design, VHDL, and Verilog, Frank Vahid, John Wiley and Sons, 2nd Edition 2010.
3. Fundamentals of Logic Design, Enhanced Edition Roth, C.H. & L. L. Kinney, 7th edition, CENGAGE Learning, 2020.

Course Website: MS -Teams

Schedule & Duration: 16 Weeks: (50-minute 48 lectures, 75-min, 32 lectures)

Student Material: Textbook, class handouts, lecture notes, and any additional reading assigned by the instructor

Minimum College Facilities: On Campus: Classroom with whiteboard, projector, and projection display

Online: MS Teams Platform

Course Objectives: The objectives of this course are:

1. Introduce students to digital systems
2. Introduce students to the analysis and design of simple combinational and sequential digital circuits.

Course Outcomes and Relation to ABET Program Outcomes: Upon successful completion of this course, a student should be able to:

1. Carry out arithmetic computations in various numbering systems (Binary, Octal, and Hexadecimal) [1].
2. Apply the rules of Boolean algebra and Karnaugh maps to simplify Boolean expressions [1].
3. Translate Boolean expressions into equivalent truth tables and

logic gates implementations and vice versa [1].
4. Understand the function of combinational functional blocks such as decoders, encoders, multiplexors, and adders, and the design with these components [1,2].
5. Design efficient combinational and sequential logic circuit implementations from functional description of digital systems [1,2].

Course Topics:

1. Introduction to Digital Systems (Chapter 1)
2. Number Systems and Operations (Chapter 1)
3. Boolean Algebra and Logic Gates (Chapter 2)
4. Simplification of Boolean Functions (Chapter 3)
5. Combinatorial Logic (Chapter 4)
6. Combinational Logic with MSI and LSI (Chapter 5)
7. Arithmetic Logic (Chapter 5 and Chapter 1)
8. Sequential Logic (Chapter 6)
9. Registers and Counters (Chapter 7)

Computer Usage: Practical aspects of the course are covered in Digital Logic Lab 0907234.

Attendance: Class attendance will be taken every class, and the university's polices will be enforced in this regard.

Grading policy:

First Exam	20%
Second Exam	30%
Final Exam	50%

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Office Hours TBD

Program Outcomes (PO)

1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	an ability to communicate effectively with a range of audiences
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies