Associate Degree Program	
Specialization	**Common**
Course Number	**020400113**
Course Title	**Digital Fundamentals**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

وصف المادة الدراسية:

Study of numerical systems, theory of Boolean algebra and logic circuits, applications to different types of circuits, study of flip-flops, counters, registers and accumulators, digital system memory including ROM, RAM, and EPROM.

أهداف المادة الدراسية:

1. To be familiar with number systems and its conversion.
2. To understand logic functions, gates, and Boolean algebra.
3. To understand combinational circuits.
4. To understand sequential logic circuits.
5. To be familiar with different types of memory.

الوصف العام:

رقم الوحدة	اسم الوحدة	محتويات الوحدة	الزمن
1.	NUMBERS SYSTEM AND CODES	▪ Introduction ▪ Decimal, binary, octal and hexadecimal numbers system ▪ Number system conversion ▪ Binary arithmetic ▪ 1's and 2's complement of binary number ▪ binary coded decimal (BCD) ▪ digital coded (Gray,Excess-3 and ASC II codes)	2 Weeks
2.	LOGIC GATES	▪ The inverter ▪ The AND gate ▪ The OR gate ▪ The NAND gate ▪ The NOR gate ▪ The Exclusive-OR and Exclusive-AND gates ▪ Application of logic gates in industry	2 Weeks
3.	BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION	▪ Boolean operation and expressions ▪ Laws and rule of Boolean algebra ▪ De Morgan's theorem ▪ Simplifications using Boolean algebra ▪ Standard forms of Boolean expression ▪ The Karnaugh map ▪ Karnaugh map minimization	2 Weeks
4.	COMBINATIONAL LOGIC	▪ Implementing combinational logic ▪ The universal property of NAND and NOR gates ▪ Implementation using NAND and NOR gates ▪ Operation with pulse waveforms ▪ Troubleshooting and application	2 Weeks
5.	FUNCTIONS OF COMBINATIONAL LOGIC	▪ Half adders, full adders, parallel adders ▪ Comparators ▪ Encoders and decoders ▪ Multiplexing ▪ Application	2 Weeks

6.	**FLIP-FLOPS**	▪ Sequential logic circuits ▪ Edge-trigged Flip-Flops (S-R, J-K, D) ▪ Master-slave Flip-Flops ▪ Flip-Flop operation characteristic ▪ Flip-Flops application	**2 Weeks**
7.	**COUNTERS**	▪ Asynchronous counters ▪ Synchronous counters ▪ Up/Down synchronous ▪ Cascaded counters ▪ Counter application	**2 Weeks**
8	**SHIFT REGISTERS**	▪ Basic shift registers functions ▪ Serial in / serial out shift registers ▪ Serial in / parallel out shift registers ▪ parallel in / serial out shift registers ▪ parallel in / parallel out shift registers	**Week**
9	**MEMORIES**	▪ Basic of semiconductors memories ▪ Read-only memories (ROMs) ▪ Programmable ROMs (PROMs and EPROMs) ▪ Read/Write Random –Access Memories(RAMs) ▪ Memory expansion	**Week**

الكتب والمراجع:

1. Tomas Floyd "Digital Fundamentals" sixth edition, Prentice-Hall, Inc.NJ.,USA,1997
2. William Kleitz, "Digital Electronics a practical approach" third edition, prentice-Hall career &technology Englewood Clifts, NJ.,USA, 1993.
3. Morris Manor: digital design, Prentice Hall

Associate Degree Program	
Specialization	**Common**
Course Number	**020400114**
Course Title	**Digital Fundamentals Lab**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**3**

وصف المادة الدراسية:

- Testing and troubleshooting instruments, Logic circuits, adders, comparators, encoders and decoders, flip-flops, counters, registers, memories RAM, ROM, EPROM

أهداف المادة الدراسية:

1. This lab course is to provide an introduction to the characteristics of digital logic and the design, construction, testing and debugging of simple digital circuits.

الوصف العام:

رقم التجربة	اسم التجربة	محتويات التجربة	الزمن (أسبوع)
.1	Testing and troubleshooting instruments		Week
.2	Logic gates	NOT, OR, AND, NOR, NAND, XOR, XNOR	2 Weeks
.3	Boolean algebra and Demorgan theorems		Week
.4	Karnaugh maps		Week
.5	Half-adders , full adders , and parallel adders		Week
.6	comparator		Week
.7	encoders		Week
8.	Decoders and seven-segment display		Week
9.	Multiplexer and de-multiplexer		Week
10	Flip-flop		Week
11.	Asynchronous counters		Week
12	synchronous counters		Week
13	Registers		Week
14	memories		Week
15	ALU (Arithmetic Logic Unit)		Week

الكتب والمراجع:

1. كراسة مختبر الالكترونيات الرقمية / اعداد : مدرس المادة
2. William Kleitz, "Digital Electronics a practical approach" third edition, prentice-Hall career &technology Englewood Clifts, NJ.,USA, 1993.
3. Morris Manor: digital design, Prentice Hall