التسلسل	المادة الدراسية	مفردات المادة
1	رياضيات	**Part A: Calculus:** 1- Functions and Their Graphs 2- Limits and Continuity 3- Derivatives and their Applications 4- Integration and its Applications 5- Matrices and System of Linear Algebraic Equation **Part B: Advance Mathematics:** 1- Ordinary Differential Equations (ODEs): 2- Vectors 3- Complex numbers 4- Fourier series
		مراجع المادة الدراسية 1- George B. Thomas, Jr., Calculus. 2- **Erwin Kreyszig, Advanced Engineering Mathematics.**
2	مبادئ الميكانيك	**Part A: General principles of engineering mechanics** 1- Forces and Couples 2- kinematics of particle 3- kinetics of particle 4- kinematics of Rigid body 5- Thermodynamics and principles of heat transfer 6- Mechanical vibration **Part B:Thermodynamics** 1- The First Law of Thermodynamics 2- Closed System and Open System 3- The second Law of Thermodynamics
		مراجع المادة الدراسية 1. Engineering Mechanics, STATICS, Bedford A. and Fowler W., PEARSON, Prentice Hall, 5th Edition 2. Engineering Mechanics: Dynamics 5th edition by Meriam, J. L., Kraige, L. G. (2003) 3. Thermodynamics: An Engineering Approach, Çengel and Boles, McGraw-Hill, 6th Edition 2002
3	مبادئ ألكترونيك	1- Semiconductor Diode, Diode applications and special Diodes 2- Bipolar Junction Transistor (BJT) Construction and Operation 3- Transistor configuration (C.B, C.E and C.C) 4- Dc Bias Circuits of Transistors 5- BJT Small signal analysis 6- Class A, Class B, and Class C Power Amplifiers Circuits 7- Field Effect Transistors (FET, MOSFET, VMOS, and CMOS) Construction and Operation 8- FET Biasing and Small signal analysis
4	نظم سيطرة (أساسيات)	1- Introduction to control system. 2- Mathematical model of physical system, mechanical system. 3- Mathematical model of physical system, electrical system. 4- Block diagram, Block diagram reduction. 5- Signal flow graph representation, mason gain formula. 6- Modelling in state space. 7- Transient response analysis, First order system.

8- Transient response analysis, Second order system. 9- Damping ratio and natural frequency. 10- Higher order system. 11- Steady- state error in unity feedback. 12- Classification of control system. 13- Routh stability criterion. 14- Introduction to Frequency Response. 15- Root Locus Analysis. 16- Relative Stability, Gain Margin, Phase Margin. 17- P, PI, and PID Controller. 18- The analysis of control system in state space. 19- Controllability and Observability. 20- Sampled data system analysis		
Part A: Automation 1- Industrial Automation systems 2- Sensing and Actuation Elements 3- Building blocks of automation system 4- Sequence/Logic Control 5- Programmable Logic Controllers (PLC): Advantage, HW, IEC 1131-3, Applications 6- Formal Modelling of Sequence Control: Specifications and Structured RLL Programming 7- Sequential Function Charts 8- Computer Numerically Controlled (CNC) Machines **Part B: Pneumatic and hydraulic systems** 1- Power supply unit 2- Directional Control Valves 3- Non-return Control Valves 4- Flow Control Valves 5- Pressure Control Valves 6- Linear and rotary actuators	**أتمتة**	5
1- Internal Architecture of the 8086 Microprocessor. 2- Addressing Modes 3- Unsigned and Signed number: addition, subtraction, multiplication, and division 4- Assembly Language Programming 5- Logic, shift, compare, rotate, Data transfer, loop, and control transfer instructions 6- Input/output address decoding and design 7- Memory types, Cache memory and Memory design 8- Interfacing with Programmable Peripheral Interface 8255.	**معالجات**	6
1- Link properties: Link-connection description, Derivation of link transformations 2- Forward kinematics 3- Joint's angle: Inverse kinematics of serial robots 4- Linear and rotational velocity of rigid bodies, velocity propagation from link to link. 5- JACOBIANS: Singularities 6- Forces: Static force in manipulators. 7- Dynamics: Newton's equation, Euler's Equation, Iterative Newton-Euler dynamic formulation 8- Lagrangian Formulation of manipulator dynamics	**روبوت**	7

9- Trajectory generation: Cubic polynomials, Linear segment with parabolic bade (LSPB). 10- Linear Control of manipulator: Feedback and closed-loop control, second order linear systems.		
مراجع المادة الدراسية Introduction to robotics mechanics and control, John J. Craig, SI. Units. Third ed., 2005		
1- Artificial Neural Networks: Single Neuron Model, Feedforward Neural Networks, Backpropagation (EBP) Training Algorithm, Radial Basis Function Neural Networks 2- Fuzzy Logic: Membership Functions, Standard Fuzzy Systems (SFS), Adaptive Neuro-Fuzzy Inference Systems (ANFIS) 3- Evolutionary algorithm: Encoding and Decoding, Mutation, Crossover, Offspring generation.	**ذكاء صناعي**	8
مراجع المادة الدراسية Fundamentals of Computational Intelligence: Neural Networks, Fuzzy Systems, and Evolutionary Computation" (IEEE Press Series on Computational Intelligence) 1st Edition by James Keller, Derong Liu, and David Fogel.		