

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 405201      **Description:** Ethics and Communication Skills

**Full Course Description:** missing

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**Course ID:** 405211      **Description:** Dynamics and Vibrations

**Full Course Description:** Introduction to dynamics and vibration of mechanical systems, three-dimensional particle kinematics, force-momentum formulation for systems of particles and for rigid bodies, Newton-Euler equations, work-energy formulation for systems particles and for rigid bodies, virtual displacements and work, free and forced vibration of linear damped lumped parameter multi-degree of freedom models of mechanical systems. □  
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**Course ID:** 405231      **Description:** Control Systems (1)

**Full Course Description:** Introduction to control systems, modeling of physical systems: electrical, mechanical, system representations: system block diagrams and signal flow graphs, state variable models, feedback control system

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**Course ID:** 405232      **Description:** Control Systems Lab.

**Full Course Description:** missing

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**Course ID:** 405301      **Description:** Technical Writing

**Full Course Description:** Nature, types, levels and style of technical writing: Common errors in usage. Formal, informal and laboratory reports. Selection and presentation of graphic aids. Statistics in technical writing

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**Course ID:** 405311      **Description:** Digital Logic and Digital Electronics

**Full Course Description:** Introduction to number systems, arithmetic operations, Boolean algebra, and Karnaugh map. Simplification and manipulation. Concept of Minterms and Maxterms. Combinational logic design, sequential logic design, and programmable logic arrays. Read only memory. Diodes and transistors as switches. Types of amplifiers. Diode-Transistor Logic Gates, Transistor-Transistor Logic Gates, Direct Coupled Emitter-Follower Logic, and Logic-Gate Structures using field effect transistors. Multivibrators, Astable, Monostable and Bistable circuits. Analog-to-Digital and Digital-to-Analog circuits. Laboratory applications.

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**Course ID:** 405312      **Description:** Digital Logic and Digital Electronics lab.

**Full Course Description:** Introduction to measuring equipments, Boolean Algebra and Design of logic circuits. Adders and subtractors BCD, Binary detectors and encoders, Flip-flops. Shift registers, ROM, RAM, Transistors as switching devices, RTL, TTL, and CMOS logic circuits. TTL and CMOS characteristics. Monostable and astable multiviberators, timing circuits. A/D and D/A circuits.

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**Course ID:** 405321      **Description:** Microprocessors for Mechatronics

**Full Course Description:** The objective of this course is to familiarize students with microprocessors and microcomputers hardware and operation. History and development of microprocessors. Numbers and number systems. Digital systems fundamentals: Binary signals, binary variable notation and logic functions. Microcomputer components: Central processing unit (CPU), clock and timing, bus operation, memory devices, circuits and interfacing. I/O interface circuits and peripheral devices. Interrupts. Serial and parallel port interface.

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**Course ID:** 405322      **Description:** Electronics

**Full Course Description:** missing

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**Course ID:** 405323      **Description:** Electronics Lab.

**Full Course Description:** missing □

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 405324      **Description:** Digital Logic and Digital Electronics

**Full Course Description:** Number systems, arithmetic operations and Boolean algebra, DeMorgan's theorem, Karnough map, simplification and manipulation, concept of minterms and maxterms, combinational logic design, design and analysis procedure for decoders, encoders, multiplexers, binary adders/subtractors: half, full and ripple carry adders, sequential logic circuits; design and analysis procedures for latches, flip-flops, registers and counters, diodes and transistors as switches and types of amplifiers, logic family gates as TTL, DTL, RTL, and ECL, analogue-to-digital and digital-to-analogue circuits.

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**Course ID:** 405325      **Description:** Digital Logic and Digital Electronics Lab.

**Full Course Description:** Introduction to measuring equipments, Boolean Algebra and Design of logic circuits. Adders and subtractors BCD, Binary detectors and encoders, Flip-flops. Shift registers, ROM, RAM, Transistors as switching devices, RTL, TTL, and CMOS logic circuits. TTL and CMOS characteristics. Monostable and astable multiviberators, timing circuits. A/D and D/A circuits

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**Course ID:** 405331      **Description:** Control Systems (2)

**Full Course Description:** missing

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**Course ID:** 405341      **Description:** Transducers & Interfacing

**Full Course Description:** Static, dynamic and statistical characteristics of measurement system elements. Loading effects in measurement systems. Sensing elements: Resistive, capacitive, inductive, electromagnetic, thermoelectric, elastic, piezoelectric and electrochemical sensing elements. Optical and ultrasonic measurement systems. Signal conditioning elements: Deflection bridges and amplifiers. Signal processing elements: Analogue to digital (A/D) conversion.

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**Course ID:** 405342      **Description:** Transducers & Interfacing Lab.

**Full Course Description:** Experiments on transducers and their construction. Experimental identification of static characteristics of sensing elements: Ideal straight line, non-linearity, sensitivity, hysteresis, resolution, and error bands. Experiments on loading effects in measurement systems. Experiments on deflection bridges and amplifiers. Analogue to digital conversion and data acquisition.

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**Course ID:** 405343      **Description:** Electrical Machines for Mechatronics

**Full Course Description:** Review of magnetic fields and circuits. Single and three phase transformers. Electromechanical energy conversion. DC-machines: DC-generators and DC-motors. Starting DC-motors and speed control. AC-machines: Single and three phase induction motors. Three phase synchronous machines. Inverters. Stepping motors and their power electronic drives. Voice coil motors. Laboratory applications.

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**Course ID:** 405344      **Description:** Electrical Machines for Mechatronics Lab.

**Full Course Description:** Laboratory experiments on single and three phase transformers. Electromechanical energy conversion, DC-machines: DC-generators and DC-motors, starting DC-motors and speed control, AC-machines: single and three phase induction motors. Three phase synchronous machines. Inverters. Stepping motors and their power electronic drives

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**Course ID:** 405351      **Description:** Electrical Machines

**Full Course Description:** Review of magnetic fields and circuits. Single and three phase transformers. Electromechanical energy conversion. DC-machines: DC-generators and DC-motors. Starting DC-motors and speed control. AC-machines: Single and three phase induction motors. Three phase synchronous machines. Inverters. Stepping motors and their power electronic drives. Voice coil motors. Laboratory applications

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**Course ID:** 405352      **Description:** Electrical Machines Lab.

**Full Course Description:** Laboratory experiments on single and three phase transformers. Electromechanical energy conversion, DC-machines: DC-generators and DC-motors, starting DC-motors and speed control, AC-machines: single and three phase induction motors. Three phase synchronous machines. Inverters. Stepping motors and their power electronic drives

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 405353      **Description:** System Modeling and Simulation

**Full Course Description:** Unified methods for modeling and simulating mechatronics systems with emphasis on mixed component systems containing electrical, mechanical, thermal and fluid elements; modeling of mixed physical systems by lumped-parameter linear elements, energy methods, linear graphs, bond graphs, system analogies, state space formulation, analytical and numerical solutions, time response, dynamic response specifications, stability considerations and closed-loop systems, elementary feedback control systems, case studies of mechatronics systems .

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**Course ID:** 405354      **Description:** Robotics

**Full Course Description:** Introduction to robotics, applications of robotics, spatial description and transformation, manipulator forward and inverse kinematics, workspace, singularity, redundancy, manipulator dynamics, trajectory generation.

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**Course ID:** 405355      **Description:** Transducers and Interfacing

**Full Course Description:** Static, dynamic and statistical characteristics of measurement system elements. Loading effects in measurement systems. Sensing elements: Resistive, capacitive, inductive, electromagnetic, thermoelectric, elastic, piezoelectric and electrochemical sensing elements. Optical and ultrasonic measurement systems. Signal conditioning elements: Deflection bridges and amplifiers. Signal processing elements: Analogue to digital (A/D) conversion.

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**Course ID:** 405356      **Description:** Transducers and Interfacing Lab.

**Full Course Description:** Experiments on transducers and their construction. Experimental identification of static characteristics of sensing elements: Ideal straight line, non-linearity, sensitivity, hysteresis, resolution, and error bands. Experiments on loading effects in measurement systems. Experiments on deflection bridges and amplifiers. Analogue to digital conversion and data acquisition.

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**Course ID:** 405400      **Description:** Practical Training

**Full Course Description:** A practical training of eight (8) weeks period in an engineering institute approved by the department is a must whether it is inside or outside Jordan

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**Course ID:** 405412      **Description:** Thermofluids for Mechatronics Engineering

**Full Course Description:** missing

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**Course ID:** 405421      **Description:** Microcomputer Interfacing

**Full Course Description:** The objective of this course is to familiarize students with microprocessor and microcomputer software architecture. Software architecture and software model. Memory addressing and data formats. Instruction set, machine codes and addressing modes. Assembly language and microprocessor programming. The PC DEBUG programs. Microprocessor and microcomputer. Laboratory applications.

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**Course ID:** 405431      **Description:** Motor Drive Systems

**Full Course Description:** Review of modeling and characteristics of DC and AC motors during transient and steady state, power electronic devices and switches, operation, drive, and control of electric motors using classical (relays and contactors) and modern (power electronics) methods, motor behavior when operated from variable power sources (converters), DC motor drives using phase-control and choppers, AC motor drives for induction motors using phase, frequency (inverters), and vector control.

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**Course ID:** 405432      **Description:** Hydraulic and Pneumatic Control Systems

**Full Course Description:** Review of fluid power systems, physical properties of hydraulic systems, hydraulic energy and power, frictional losses in pipelines, hydraulic pumps, cylinders, motors, and valves, circuit design and analysis, maintenance of hydraulic systems, air preparation and components of pneumatic systems, circuits and applications, basic electrical control for fluid power circuits, fluid logic control.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 405433      **Description:** Digital Control Systems

**Full Course Description:** missing

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**Course ID:** 405434      **Description:** Intelligent Control Systems

**Full Course Description:** a

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**Course ID:** 405435      **Description:** Industrial Process Control

**Full Course Description:** Industrial control systems: sensors, actuators and other control components, Process Control Systems, Programmable Logic Controllers (PLCs), PLC-based system design, integration, operation, and programming (using ladder diagrams), fundamentals of Computer Numerical Controlled (CNC) machines and programming concepts.

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**Course ID:** 405436      **Description:** Control of Robotic Systems

**Full Course Description:** missing

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**Course ID:** 405441      **Description:** Design of Microcontrollers-Based Systems

**Full Course Description:** missing

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**Course ID:** 405442      **Description:** Microcontrollers Lab.

**Full Course Description:** Experiments on hardware and software techniques for real-time applications incorporating electrical, electronic, and electromechanical systems, hardware-software interactions, programming internal peripherals, and real-time control and conditioning of external devices using microprocessors and microcontrollers such as Motorola, Microchip, Intel, or any other equivalent product

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**Course ID:** 405443      **Description:** Design of Mechatronics Systems

**Full Course Description:** Introduction to mechatronics systems design, mathematical modeling and computer simulation of mechatronics systems, control system performance analysis and applications, comprehensive projects where the students try to combine their skills in electrical, mechanical and computer technologies to produce integrated mechatronics systems.

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**Course ID:** 405444      **Description:** Computer Aided Design

**Full Course Description:** Introduction to methods of determining, analyzing, and modeling of mechatronics systems using software packages such as Matlab and Simulink, systematically analyze, design, and tune linear control systems, tune the controller parameters using automated and interactive techniques, and verify performance, design of single- and multi- loop control systems using a variety of classical and state space techniques.

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**Course ID:** 405445      **Description:** Design of Mechanisms and Automated Machinery

**Full Course Description:** missing

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**Course ID:** 405446      **Description:** Machine Design for Mechatronics

**Full Course Description:** Introduction to the concept of mechanical design. It includes various materials needed to design mechanical system elements. Initially students will be familiar with some concepts and definitions, and then they will be introduces to the considerations and procedures of mechanical elements design.

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**Course ID:** 405450      **Description:** Autotronics

**Full Course Description:** Applications of mechatronics systems in modern automobiles, fuel, ignition, and braking systems, electronic suspension and steering systems, actuators' diagnosis and services, emission control, on-board diagnostic, road safety systems, air conditioning systems, automatic transmissions, comfort and safety systems, and automotive computers.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 405453      **Description:** Hydraulic & Pneumatic Control Systems

**Full Course Description:** The objective of this course is to familiarize students with fluid power systems design and operation. Incompressible and compressible flow. The distribution system. Source of hydraulic and pneumatic power: pumps and compressors. Actuators: linear actuators (hydraulic and pneumatic cylinders). Limited rotation actuators. Gear motors, vane motors and piston motors. Hydraulic and pneumatic valves. Design and analysis of hydraulic and pneumatic circuits

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**Course ID:** 405455      **Description:** Digital Control

**Full Course Description:** Introductory Digital Control, Discrete Systems Analysis, Sampled-Data Systems, Discrete Equivalents, Design Using Transform Techniques, Design Using State-Space Methods. Quantization Effects, Sample Rate Selection, System Identification. Pole placement controllers.

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**Course ID:** 405456      **Description:** Automation

**Full Course Description:** Industrial control systems: sensors, actuators and other control components, Process Control Systems, Programmable Logic Controllers (PLCs), PLC-based system design, integration, operation, and programming (using ladder diagrams), fundamentals of Computer Numerical Controlled (CNC) machines and programming concepts.

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**Course ID:** 405457      **Description:** Automation Lab.

**Full Course Description:** Experiments on PLC programming: ladder diagram and instruction list, process control, scale-down production stations, pneumatic and electro-pneumatic systems, troubleshooting of PLC systems, PID control laws in process control systems, advanced control strategies in process control.

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**Course ID:** 405458      **Description:** Mechatronics Lab.

**Full Course Description:** Experiments related to various topics in mechatronics engineering such as robotics, industrial lines control systems, and robot applications in manufacturing

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**Course ID:** 405459      **Description:** Micro-Electro-Mechanical Systems (MEMS)

**Full Course Description:** Principles and applications of micro-electromechanical systems, fabrication and micromachining techniques, micromechanics, microsensing, and microactuating mechanisms, modeling and simulation of microstructure, case studies include mechanical, electrical, Industrial, biomedical, and computer applications.

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**Course ID:** 405460      **Description:** Computer Aided Design

**Full Course Description:** The objective of the course is to familiarize students with principles of Computer-Aided-Design. The course contents are: Introduction to Computer-Aided-Design. Transformation and manipulation of objects. Description of curves and surfaces. Solid modeling. Optimization techniques. Introduction to the Finite-Element Method for analysis of trusses, heat-conduction and analysis of dynamic systems. Introduction to Computer-Integrated-Manufacturing.

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**Course ID:** 405462      **Description:** Automation

**Full Course Description:** Manufacturing operations. Automation and control technologies. Industrial control systems: Sensors, actuators and other control components. Numerical control. Material handling and transportation systems. Industrial robotics. Fundamentals of CNC and programming concepts: CNC milling and turning machines. PLC design, structure and operation. Ladder programming of PLC with applications. Laboratory applications.

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**Course ID:** 405463      **Description:** Design of Mechatronics Systems

**Full Course Description:** Background on mechatronics systems design. Mathematical modeling and computer simulation of mechatronics systems. Control system performance analysis. Comprehensive projects where the students try to combine their skills in electrical, mechanical and computer technologies to produce functional mechatronics systems.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 405466      **Description:** Practical Training

**Full Course Description:** A practical training of eight (8) weeks period in an engineering institute approved by the department is a must whether it is inside or outside Jordan

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**Course ID:** 405467      **Description:** Special Topics in Mechatronics

**Full Course Description:** Current trends and development in the field of Mechatronics engineering

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**Course ID:** 4405451      **Description:** Control Systems (1)

**Full Course Description:** Open and closed loops (feedback) control systems. Modeling of physical systems: electrical, Mechanical, hydraulic and pneumatic systems. Linearization of nonlinear systems. System representations: System block diagrams and signal flow graphs. State variable models. Feedback control system characteristics. Performance of feedback control systems. Routh-Hurwitz stability. Steady state error coefficient. Rout locus Method. Introduction to frequency response

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**Course ID:** 4405452      **Description:** Control Systems Lab.

**Full Course Description:** Open and closed loop systems. Servomechanism principles. Effect of gain, integral, derivative control, and velocity feedback on system performance. Frequency response measurements. Computer aided design of control systems. Control of flow, liquid level, magnetic, electrical, mechanical and thermal systems

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**Course ID:** 4405454      **Description:** Control Systems(2)

**Full Course Description:** Frequency response methods. Stability in frequency domain. Design of feedback control systems. Design of state variable feedback systems. Introduction to digital control. Computer control.

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**Course ID:** 4405461      **Description:** Robotics

**Full Course Description:** Spatial description and transformation. Manipulator kinematics and inverse manipulator kinematics. Jacobians: Velocities and static forces. Manipulator dynamics. Trajectory generation and linear control of manipulators. Introduction to mobile robot. Laboratory applications.

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**Course ID:** 4405495      **Description:** Special Topics

**Full Course Description:** Current trends and developments in the field of mechatronic engineering.

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**Course ID:** 110405211      **Description:** Dynamics and Vibration

**Full Course Description:** a

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**Course ID:** 110405311      **Description:** Modeling and Simulation

**Full Course Description:** Unified methods for modeling and simulating mechatronics systems with emphasis on mixed component systems containing electrical, mechanical, thermal and fluid elements; modeling of mixed physical systems by lumped-parameter linear elements, energy methods, linear graphs, bond graphs, system analogies, state space formulation, analytical and numerical solutions, time response, dynamic response specifications, stability considerations and closed-loop systems, elementary feedback control systems, case studies of mechatronics systems .

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**Course ID:** 110405322      **Description:** Digital Logic and Digital Electronics

**Full Course Description:** Number systems, arithmetic operations and Boolean algebra, DeMorgan's theorem, Karnough map, simplification and manipulation, concept of minterms and maxterms, combinational logic design, design and analysis procedure for decoders, encoders, multiplexers, binary adders/subtractors: half, full and ripple carry adders, sequential logic circuits; design and analysis procedures for latches, flip-flops, registers and counters, diodes and transistors as switches and types of amplifiers, logic family gates as TTL, DTL, RTL, and ECL, analogue-to-digital and digital-to-analogue circuits.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 110405323      **Description:** Electrical Machines

**Full Course Description:** Basic principles of electrical machines and energy conversion, principles and operation of single and three phase transformers, principles, operation, key characteristics, and applications of DC motors, single and three-phase AC motors, and special purpose motors (e.g., stepper motors, brushless dc motors, and linear motors), introduction to DC and AC generators.

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**Course ID:** 110405331      **Description:** Automatic Control

**Full Course Description:** Introduction to control systems, modeling of physical systems: electrical, mechanical, system representations: system block diagrams and signal flow graphs, state variable models, feedback control system characteristics, performance of feedback control systems, Routh-Hurwitz stability criterion, root locus method, frequency response, and PID control.

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**Course ID:** 110405332      **Description:** Automatic Control Lab.

**Full Course Description:** This laboratory aims to implement different control system ideas learned in control systems courses and to give the student a practical application and an on-hands experience of the functions of control systems such as servo motor control and PID control.

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**Course ID:** 110405411      **Description:** Theory of Mechanisms and Machinery

**Full Course Description:** kinematics and dynamics of various machine elements and systems used in mechatronics systems: linkages, cams, gears, and gear trains, analysis and synthesis (design) with multiple solutions, visualization and analysis of motions in mechanics, mechanisms design to achieve desired motion specifications, graphical, analytical, and computer-based techniques.

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**Course ID:** 110405421      **Description:** Logic and Electronics Lab.

**Full Course Description:** Experiments on digital logic gates, half and full adders and comparators, multiplexers and decoders, state diagram (D-flip-flops and JK-flip-flops), counters, shift registers, diodes, voltage regulators, bipolar junction transistors (BJTs), DC biasing, operational amplifiers, amplifier frequency response, multistage amplifiers, JFET amplifiers, and power electronics.

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**Course ID:** 110405422      **Description:** Motor Drive Systems

**Full Course Description:** Review of modeling and characteristics of DC and AC motors during transient and steady state, power electronic devices and switches, operation, drive, and control of electric motors using classical (relays and contactors) and modern (power electronics) methods, motor behavior when operated from variable power sources (converters), DC motor drives using phase-control and choppers, AC motor drives for induction motors using

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**Course ID:** 110405423      **Description:** Electrical Machines and Drive Lab.

**Full Course Description:** Experiments on single and three-phase transformers, autotransformers, separately excited, shunt, series, and compound DC motors, three-phase induction motors, DC and AC generators, speed control and drive systems (convertors and invertors).

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**Course ID:** 110405424      **Description:** Microprocessors and Microcontrollers

**Full Course Description:** Introduction to microprocessor and microcontroller systems, architecture of 8088/8086 microprocessors and fundamentals of operation, architecture of microcontrollers and fundamentals of operation, hardware and software techniques for real-time applications incorporating electrical, electronic, and electromechanical systems, hardware-software interactions, programming internal peripherals, and real-time control and conditioning of external devices using microprocessors and microcontrollers such as Motorola, Microchip, Intel, or any other equivalent product.

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**Course ID:** 110405425      **Description:** Microprocessors and Microcontrollers Lab.

**Full Course Description:** Experiments on hardware and software techniques for real-time applications incorporating electrical, electronic, and electromechanical systems, hardware-software interactions, programming internal peripherals, and real-time control and conditioning of external devices using microprocessors and microcontrollers such as Motorola, Microchip, Intel, or any other equivalent product.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 110405431      **Description:** Transducers and Interfacing

**Full Course Description:** Static and dynamic characteristics as well as time response of measurement systems, error and uncertainty analysis, analog and digital signal conditioning, basics of data acquisition systems, transducers of thermal, mechanical, and optical systems, measurement systems design.

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**Course ID:** 110405432      **Description:** Control and Transducers Lab.

**Full Course Description:** Experiments on temperature, optical, and mechanical transducers, analog and digital signal conditioning.

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**Course ID:** 110405441      **Description:** Automation

**Full Course Description:** Industrial control systems: sensors, actuators and other control components, Process Control Systems, Programmable Logic Controllers (PLCs), PLC-based system design, integration, operation, and programming (using ladder diagrams), fundamentals of Computer Numerical Controlled (CNC) machines and programming concepts.

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**Course ID:** 110405442      **Description:** Robotics

**Full Course Description:** Introduction to robotics, applications of robotics, spatial description and transformation, manipulator forward and inverse kinematics, workspace, singularity, redundancy, manipulator dynamics, trajectory generation.

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**Course ID:** 110405451      **Description:** Practical Training

**Full Course Description:** A practical training of eight (8) weeks period in an engineering institute approved by the department is a must whether it is inside or outside Jordan.

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**Course ID:** 110405511      **Description:** Hydraulic and Pneumatic Systems

**Full Course Description:** Review of fluid power systems, physical properties of hydraulic systems, hydraulic energy and power, frictional losses in pipelines, hydraulic pumps, cylinders, motors, and valves, circuit design and analysis, maintenance of hydraulic systems, air preparation and components of pneumatic systems, circuits and applications, basic electrical control for fluid power circuits, fluid logic control.

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**Course ID:** 110405531      **Description:** Advanced Control

**Full Course Description:** Frequency response methods: Bode diagram, polar plot, and log-magnitude-phase plot, Nyquist stability criterion, compensators, PID controllers, signal sampling and reconstruction, digital control algorithms and filters, time response of discrete time systems, and design and implementation of control systems using digital computers.

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**Course ID:** 110405532      **Description:** Artificial Intelligence

**Full Course Description:** Introduction to intelligent systems and their application in modeling and control, basic concepts of fuzzy logic elements, design, tuning and operation, basic concepts of neural network elements, architecture, and training, basic concepts of genetic algorithms, design, optimization problems.

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**Course ID:** 110405533      **Description:** Modern Control Theory

**Full Course Description:** Introduction to feedback control, basic matrix theory, state-space modeling and dynamic response of linear systems, frequency-domain analysis, controllability, observability, pole placement design, estimation and compensator design, optimal control.

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**Course ID:** 110405534      **Description:** Control of Robotic Systems

**Full Course Description:** Introduction to sensors and actuators in robotic systems, linear and nonlinear control techniques for robotic systems, force and motion control methods, introduction to control of mobile robots and telerobotics.



## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 110405541      **Description:** Process Control Lab.

**Full Course Description:** Experiments on PLC programming: ladder diagram and instruction list, process control, scale-down production stations, pneumatic and electro-pneumatic systems, troubleshooting of PLC systems, PID control laws in process control systems, advanced control strategies in process control.

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**Course ID:** 110405542      **Description:** Design of Mechatronics Systems

**Full Course Description:** Introduction to mechatronics systems design, mathematical modeling and computer simulation of mechatronics systems, control system performance analysis and applications, comprehensive projects where the students try to combine their skills in electrical, mechanical and computer technologies to produce integrated mechatronics systems.

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**Course ID:** 110405543      **Description:** Mechatronics Systems Lab.

**Full Course Description:** Experiments related to various topics in mechatronics engineering such as robotics, industrial lines control systems, and robot applications in manufacturing

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**Course ID:** 110405544      **Description:** Computer Aided Design

**Full Course Description:** Introduction to methods of determining, analyzing, and modeling of mechatronics systems using software packages such as Matlab and Simulink, systimatically analyze, design, and tune linear control systems, tune the controller parameters using automated and interactive techniques, and verify performance, design of single- and multi- loop control systems using a variety of classical and state space techniques.

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**Course ID:** 110405545      **Description:** Micro-electro-mechanical Systems

**Full Course Description:** Principles and applications of micro-electromechanical systems, fabrication and micromachining techniques, micromechanics, microsensing, and microactuating mechanisms, modeling and simulation of microstructure, case studies include mechanical, electrical, Industrial, biomedical, and computer applications.

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**Course ID:** 110405546      **Description:** Automations Buildings

**Full Course Description:** Introduction to building automation, control signals, devices, and strategies, HVAC principles, HVAC control devices, lighting control systems, fire alarm systems, video surveillance systems, voice-data-video systems, access control systems, data networks and networks integration, building management systems, building automation protocols, smart buildings and building systems integration, energy and sustainability in automated buildings, other building systems (elevators, electric power.

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**Course ID:** 110405547      **Description:** Autotronics

**Full Course Description:** Applications of mechatronics systems in modern automobiles, fuel, ignition, and braking systems, electronic suspension and steering systems, actuators' diagnosis and services, emission control, on-board diagnostic, road safety systems, air conditioning systems, automatic transmissions, comfort and safety systems, and automotive computers.

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**Course ID:** 110405548      **Description:** Automated Principles

**Full Course Description:** Introduction to conventional internal combustion engine vehicles, electric vehicles, hybrid electric vehicles, and hybrid fuel cell vehicles, vehicle performance characteristics, power train architecture design, control strategies, components selection and sizing, and fundamentals of regenerative braking.

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**Course ID:** 110405549      **Description:** Fundamentals for Renewable Energy Systems

**Full Course Description:** Introduction to renewable energy resources, photovoltaic (PV) systems, solar-thermal systems, wind power systems, hydropower systems, geothermal heat and power systems, biomass heat and power systems, hydrogen and fuel cells systems, special focus on PV and wind energy system, hybrid power system, energy conversion systems, components selection and sizing, energy storage, control systems, and applications.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Course ID:** 110405551      **Description:** Graduation Project (1)

**Full Course Description:** Phase 1 of Senior Design Project: Planning, design, construction and management of an engineering project, having a clear design component, that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his project problem

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**Course ID:** 110405552      **Description:** Graduation Project (2)

**Full Course Description:** Phase 2 of Senior Design Project: Planning, design, construction and management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his project problem.

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**Course ID:** 110405553      **Description:** Special Topics in Mechatronics

**Full Course Description:** Current trends and development in the field of Mechatronics engineering

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**Course ID:** 150405451      **Description:** Practical Training

**Full Course Description:** A practical training of eight (8) weeks period in an engineering institute approved by the department is a must whether it is inside or outside Jordan.

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**Course ID:** 1704051312      **Description:** Mechanical Design

**Full Course Description:** Introduction to the concept of mechanical design. It includes various materials needed to design mechanical system elements. Initially students will be familiar with some concepts and definitions, and then they will be introduces to the considerations and procedures of mechanical elements design.

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**Course ID:** 2004051451      **Description:** Practical Training

**Full Course Description:** A practical training of eight (8) weeks period in an engineering institute approved by the department is a must whether it is inside or outside Jordan.

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**Course ID:** 2104051312      **Description:** Mechanical Design

**Full Course Description:** Introduction to the concept of mechanical design. It includes various materials needed to design mechanical system elements. Initially students will be familiar with some concepts and definitions, and then they will be introduces to the considerations and procedures of mechanical elements design.

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**Course ID:** 2104051329      **Description:** Electronics for Mechatronics

**Full Course Description:** missing

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**Course ID:** 2104051426      **Description:** signals and systems for Mechatronics

**Full Course Description:** Classification of signals and systems, time-domain representations of continuous time signals, time-domain analysis of continuous LTI systems, frequency-domain representations of continuous time signals, frequency-domain analysis of continuous LTI systems, time-domain representation of discrete time signals, time-domain analysis of discrete LTI systems, analog to digital conversion, sampling theorem, reconstruction of continuous time signals, z-transform, Fourier analysis, Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT), digital filter terminology and design, design of Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters, continuous and discrete filters.

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**Course ID:** 2104051427      **Description:** Communications for Mechatronics

**Full Course Description:** Introduction to basic data communication concepts and digital/analog data transmission; overview of computer communication architecture models, including the open systems interconnection (OSI) model, and the TCP/IP model; industrial network protocols (SCADA/fieldbus protocols); and data interfaces such as USB, RS-232, RS-485, and Ethernet; wireless network standards, such as Bluetooth, Wi-Fi, and ZigBee.

## Courses Description

**College:** Engineering

**Department:** Mechatronics Engineering

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**Couse ID:** 2104051441      **Description:** Automation

**Full Course Description:** Industrial control systems: sensors, actuators and other control components, Process Control Systems, Programmable Logic Controllers (PLCs), PLC-based system design, integration, operation, and programming (using ladder diagrams), fundamentals of Computer Numerical Controlled (CNC) machines and programming concepts.