



MECHATRONICS

TECHNICAL-PROFESSIONAL

Grade 12

**Three-Term Budget Of Work (BOW)
for Learning Competencies**

**TECHNICAL-PROFESSIONAL
INDUSTRIAL TECHNOLOGIES
Grade 12**

**Three-Term Budget of Work
For Learning Competencies**

Please note that each Tech-Pro elective is completed within one term if delivered at Grade 12.

Elective	Mechatronics
Prerequisite	Electronic Products Assembly and Servicing

Performance Standard	The learners perform procedures in mechatronic system installation and servicing while ensuring adherence to safety precautions.
Content Standard	The learners demonstrate an understanding of the principles of mechatronics servicing including its fundamentals, installation, and servicing.

Week	Learning Competency	Suggested Activities
1	• Explain the overview of Mechatronics System	• Mechatronics System Exploration ○ Learners explore the basic components of a mechatronics system such as sensors, actuators, controllers, and mechanical parts, and understand how these components work together in automated systems. ○ Examine sample mechatronic devices or diagrams and identify the main

Week	Learning Competency	Suggested Activities
		components and their functions in the system. • Real-World Mechatronics Mapping ○ Learners analyze everyday machines (e.g., automatic doors, washing machines, robotic arms) and determine how mechatronics concepts are applied. ○ Identify a common automated device and explain how sensors, controllers, and actuators work together in its operation.
1 - 2	• Discuss the control and power systems	• Control System Demonstration ○ Learners observe and analyze how control systems regulate machine operations using switches, relays, or programmable controllers. ○ Observe a demonstration of a simple control circuit and explain how it controls the operation of a device. • Power System Identification Activity ○ Learners identify the components responsible for supplying and distributing power within a mechatronic system.

Week	Learning Competency	Suggested Activities
		Inspect a sample power system diagram or trainer kit and label the components responsible for power supply and distribution.
2	Discuss mechatronic system installation	Installation Process Walkthrough - Learners study the step-by-step procedures involved in installing mechatronic systems including positioning components, wiring connections, and ensuring safety. - Analyze an installation procedure guide and explain the proper sequence of installing mechatronic system components. Installation Safety Brainstorming - Learners discuss the safety precautions and requirements needed during installation of mechatronic systems. - List and explain safety practices required when installing mechatronic systems in a workshop setting.
3 - 4	Apply the procedures in installation of mechatronic system based on layout plan	Layout Plan Interpretation - Learners interpret a mechatronic system layout plan to determine the

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		correct placement and connection of system components. ○ Study a provided layout plan and mark the correct locations for installing each mechatronic component. ● System Installation Practice ○ Learners perform the installation of a basic mechatronic system using the provided layout plan and installation guidelines. ○ Install the components of a basic mechatronic system according to the given layout plan and installation procedures.
5	● Discuss mechatronic system servicing	● Servicing Procedure Review ○ Learners examine standard servicing procedures for maintaining mechatronic systems including inspection, cleaning, and testing of components. ○ Review the servicing manual and explain the steps involved in maintaining a mechatronic system. ● Common System Problems Discussion ○ Learners identify common issues in mechatronic systems and discuss

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		possible causes and preventive measures. Analyze given system problem scenarios and discuss possible causes and maintenance solutions.
6 - 7	Perform the procedure in servicing mechatronic system	Mechatronic System Maintenance Practice - Learners perform routine servicing tasks such as inspecting sensors, checking wiring connections, cleaning components, and ensuring proper system function. - Service the assigned mechatronic system by inspecting, cleaning, and testing its components using proper tools and safety procedures. System Function Testing Activity - Learners test the performance of a serviced mechatronic system to confirm that all components operate correctly. - Operate and test the mechatronic system after servicing and record the system's performance results.

Suggested Performance Tasks	● Individual Performance Task: Mechatronic Device Installation Drill ○ The learner individually installs a basic mechatronic system (e.g., sensors, actuators, or a small automated device) while applying correct procedures and observing safety precautions. ○ Install the assigned mechatronic system according to the provided procedure, using proper tools and PPE, while ensuring all safety measures are followed. ● Group Performance Task: “Mechatronic System Servicing Project” ○ Learners work in groups to perform servicing on a complete mechatronic system, including inspection, troubleshooting, maintenance, and verification of proper operation, while demonstrating teamwork and adherence to safety protocols. ○ In groups, inspect, service, and test a mechatronic system, documenting the process and demonstrating proper safety practices throughout.
Performance Standard	The learners perform procedures in programmable logic controller programming and configuring while ensuring adherence to safety precautions.
Content Standard	The learners demonstrate an understanding of the principles of programmable logic controllers, and control logic programming.

Week	Learning Competency	Suggested Activities
7	● Discuss programmable logic controllers	● PLC Component Exploration ○ Learners identify the main parts of a PLC system (CPU, input/output modules, power supply) and

Week	Learning Competency	Suggested Activities
		understand their functions in controlling automated systems. - Examine a PLC trainer kit or diagram and label the components while explaining their functions in the system. PLC Applications Research - Learners investigate real-life applications of PLCs in industries such as manufacturing, robotics, and automation. - Research and present examples of industrial applications where PLCs are used and explain their roles in controlling processes.
8	Discuss control logic programming	Logic Diagram Analysis - Learners examine ladder diagrams and flowcharts to understand how control logic sequences operate in automated systems. - Analyze a sample ladder diagram and describe the logical sequence of operations for controlling a device. Logic Problem Solving - Learners apply basic logic principles to simulate simple control operations using switches, sensors, and outputs.

Week	Learning Competency	Suggested Activities
		Solve control logic problems by predicting the output of simple circuits based on given input conditions.
9 - 10	Perform programmable logic controller programming	Basic PLC Program Writing - Learners write and test a simple PLC program using ladder logic to control an output device based on input conditions. - Write a ladder logic program on a PLC simulator or trainer and test it to control an assigned output device. PLC Simulation Activity - Learners simulate a small automated process on a PLC software platform, observing how programmed instructions control system outputs. - Use PLC simulation software to run a pre-designed program and verify the sequence of operations.
11	Apply configuration of mechatronic devices	Device Parameter Setting - Learners adjust the settings and parameters of sensors, actuators, and motors to ensure proper operation within a mechatronic system. - Configure assigned mechatronic devices by setting parameters

Week	Learning Competency	Suggested Activities
		according to the system requirements and safety standards. • Integration Practice ○ Learners connect multiple mechatronic devices into a system and verify that they operate together as intended. ○ Integrate sensors, actuators, and controllers in a simple mechatronic setup and test their coordinated operation.
Suggested Performance Tasks	• Individual Performance Task: PLC Programming Drill ○ The learner individually writes and tests a simple PLC program to control a specific output device based on given input conditions, following proper procedures and safety precautions. ○ Develop and run a PLC program on a simulator or trainer kit to control an assigned output device while observing proper tool use and safety protocols. • Group Performance Task: PLC System Configuration Project ○ Learners work in groups to configure a small-scale mechatronic system using a PLC, connecting inputs and outputs, programming control logic, and testing coordinated operation safely. ○ In groups, configure and program a PLC to operate a simple mechatronic system, verifying correct operation while following all safety procedures.	