



PHOTOVOLTAIC SYSTEMS INSTALLATION

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	Photovoltaic Systems Installation
Prerequisite	None

Performance Standard	The learners perform site assessment with safety precautions.
Content Standard	The learners demonstrate an understanding of the concepts and principles of solar energy systems in Photovoltaic (PV) Systems Installation.

Week	Learning Competency	Suggested Activities
1	Discuss the concepts and principles related to Photovoltaic Systems Installation.	Solar Energy System Exploration - Learners examine the basic components of a photovoltaic (PV) system (solar panels, inverter, charge controller, battery, and wiring) and understand how sunlight is converted into electrical energy. - Present a PV system diagram or actual components and ask learners to explain the function of each part and how energy flows through the system.

Week	Learning Competency	Suggested Activities
		• Solar Power Application Case Study ○ Learners analyze real-life applications of photovoltaic systems in homes, schools, and communities to understand their advantages and limitations. ○ Assign groups to study a PV installation example and present how the system generates electricity and supports energy needs.
2	• Discuss checklist for installation parameters.	• PV Installation Checklist Development ○ Learners identify key installation parameters such as location, roof orientation, shading, structural safety, and electrical requirements. ○ Ask learners to create a step-by-step installation checklist based on standard PV system installation guidelines. • Installation Readiness Inspection Activity ○ Learners simulate the inspection of a site using a prepared checklist to determine if the location meets photovoltaic installation requirements.

Week	Learning Competency	Suggested Activities
		Provide a sample site scenario and guide learners in completing an installation parameter checklist.
3	Perform site assessment procedures.	School-Based Solar Site Assessment - Learners conduct a practical site assessment within the school campus to identify suitable areas for solar panel installation. - Using a guide sheet, instruct learners to evaluate roof direction, shading conditions, and available installation space. Solar Measurement and Data Collection Activity - Learners measure and record environmental factors such as sunlight exposure, tilt angle, and potential shading using simple tools. - Provide measuring tools and have learners document site data needed for photovoltaic system planning.
4	Report completion of work.	PV Installation Work Documentation - Learners prepare a structured report summarizing the steps performed

Week	Learning Competency	Suggested Activities
		during the simulated installation or site assessment activity. ○ Ask learners to complete a work accomplishment report including procedures performed, tools used, and observations. ● Technical Presentation of Work Output ○ Learners present the results of their PV installation or site assessment activity to demonstrate understanding of the process and outcomes. ○ In groups, instruct learners to present their completed work report and explain the procedures followed and findings.
Suggested Performance Tasks	● Individual Task: "Safe Site Inspector" ○ Learners individually conduct a basic site safety assessment of a designated workshop area or simulated construction site to identify potential hazards and evaluate safety compliance. ○ Inspect the assigned site area using a safety checklist, identify at least five hazards, and document recommended safety precautions in a short report.	

	• Group Task: “Team Site Safety Assessment” ○ Learners work in groups to perform a comprehensive site assessment, analyzing hazards, safety risks, and preventive measures, then presenting their findings. ○ In groups, assess a simulated worksite, identify hazards, demonstrate proper safety precautions, and present your safety improvement plan to the class.
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Performance Standard	The learners perform PV components inspection with safety precautions.
Content Standard	The learners demonstrate an understanding of the concepts and principles of solar energy system in Photovoltaic (PV) Systems Installation.

Week	Learning Competency	Suggested Activities
4-5	• Perform inspection of PV components, materials and measuring instruments compliance.	• PV Components Compliance Inspection ○ Learners examine photovoltaic system components such as solar panels, mounting structures, cables, connectors, and protective devices to verify if they meet basic installation and safety standards. The activity helps students become familiar with identifying compliant and non-compliant materials used in PV installations. ○ Provide sample PV components and an inspection checklist, then ask learners to inspect each item and record whether it meets the required specifications and safety standards.

Week	Learning Competency	Suggested Activities
		• Measuring Instruments Accuracy Check ○ Learners inspect and verify the condition and functionality of measuring instruments commonly used in PV installations such as multimeters, clamp meters, and solar irradiance meters. This activity strengthens learners' understanding of proper tool handling and calibration awareness. ○ Demonstrate proper instrument use and have learners check the operational condition, safety features, and accuracy of assigned measuring tools using a verification checklist.
6	• Conduct reporting of test results of PV components and materials.	• PV Testing Data Recording and Analysis ○ Learners perform simple tests on PV components such as measuring voltage output, continuity of cables, or resistance of connectors, then record and interpret the results using a structured reporting format. ○ After conducting the test procedures, instruct learners to document the measurements, interpret the results, and summarize their findings in a standard test report form. • Technical Reporting and Presentation ○ Learners prepare and present a brief technical report explaining the test procedures conducted, results obtained, and

Week	Learning Competency	Suggested Activities
		whether the components passed or failed inspection criteria. Ask learners to prepare a short written report and present their test findings to the class using charts, tables, or diagrams.

Suggested Performance Tasks	Individual Task: "PV Component Safety Check" - Learners individually inspect photovoltaic (PV) system components (e.g., solar panels, wiring, connectors, and mounting structures) to identify defects, damage, or safety hazards while applying proper safety precautions. - Using a provided inspection checklist and proper PPE, examine the assigned PV components and record any defects, hazards, and recommended corrective actions Group Task: "Solar Site Inspection Team" - Learners work collaboratively to conduct a systematic inspection of a simulated or actual PV installation, assessing the condition, safety, and functionality of different PV system components. - In groups, inspect a PV installation using safety procedures, document component conditions, and present a brief inspection report with recommended safety improvements.
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Performance Standard	The learners perform photovoltaic (solar energy) systems installation with safety.
Content Standard	The learners demonstrate an understanding of the concepts and principles of Photovoltaic (Solar Energy) Systems Installation.

Week	Learning Competency	Suggested Activities
6	Discuss safety protocols for PV systems installation.	PV Installation Safety Scenario Analysis - Learners analyze common workplace hazards during photovoltaic system installation such as electrical shock, falls from height, improper tool use, and weather-related risks, and identify appropriate safety protocols and personal protective equipment (PPE). - Present several safety scenarios related to PV installation and ask learners to identify the hazard and recommend the correct safety protocol and PPE. Safety Demonstration and PPE Inspection - Learners examine and demonstrate the proper use of safety equipment used in PV installations such as gloves, safety harness, helmet, insulated tools, and lockout procedures. - Provide PPE and safety tools and ask learners to demonstrate the correct safety preparation steps before starting a PV installation task.
7	Determine the PV installation layout, tools, and materials.	PV System Layout Planning Activity - Learners design a simple photovoltaic installation layout for a small house or building, identifying panel placement, wiring

Week	Learning Competency	Suggested Activities
		routes, inverter location, and mounting structures. ○ Provide a sample house or roof plan and ask learners to draw and label the proposed PV installation layout. ● Tools and Materials Identification Workshop ○ Learners identify and classify the tools, materials, and equipment required for photovoltaic system installation such as solar panels, mounting brackets, cables, multimeters, and connectors. ○ Display various installation tools and materials and instruct learners to categorize them according to their function in the PV installation process.
8	● Perform installation of photovoltaic systems	● Simulated PV System Assembly ○ Learners perform a step-by-step assembly of a basic photovoltaic system setup including panel connection, mounting structure preparation, and wiring connections in a controlled learning environment. ○ In groups, instruct learners to assemble a basic PV system model following the standard installation procedure and safety guidelines.

Week	Learning Competency	Suggested Activities
		• Wiring and Connection Practice ○ Learners practice connecting PV components such as panels, charge controllers, batteries, and inverters using proper wiring techniques. ○ Provide PV training kits and guide learners in completing the required electrical connections based on a given system diagram.
9	• Report completion of work.	• Installation Work Accomplishment Report ○ Learners prepare a formal work completion report summarizing the installation steps performed, tools used, materials installed, and challenges encountered during the activity. ○ Ask learners to complete a structured work report template documenting the installation process and results. • Post-Installation Technical Presentation ○ Learners present the completed PV installation activity to demonstrate understanding of the procedures and evaluate the success of the installation process. ○ In groups, instruct learners to present their installation output and explain the steps

Week	Learning Competency	Suggested Activities
		performed, safety measures followed, and system functionality.

Suggested Performance Tasks	• Individual Task: “Solar Panel Mounting Practice” ○ Learners individually demonstrate the proper installation of a photovoltaic panel on a mounting structure, applying correct procedures and observing safety precautions such as the use of PPE and safe handling of tools and components. ○ Install a photovoltaic panel on the provided mounting frame using proper tools and PPE while following the correct safety and installation procedures. • Group Task: “Mini Solar System Installation Project” ○ Learners work in groups to install a small-scale photovoltaic system, including panel placement, basic wiring connections, and safety checks, simulating a real installation process. ○ In groups, install a mini photovoltaic system by mounting the panel, connecting the basic components, and demonstrating proper safety practices during the installation.
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Performance Standard	The learners perform commissioning of photovoltaic (solar energy) system with safety precautions.
Content Standard	The learners demonstrate an understanding of the concepts and principles of Photovoltaic (Solar Energy) Systems

Week	Learning Competency	Suggested Activities
9	Apply commissioning procedures on wiring, grounding, and system components.	PV System Commissioning Simulation - Learners perform a simulated commissioning process on a small photovoltaic (PV) training setup, checking wiring connections, grounding continuity, polarity, and component installation based on a standard commissioning checklist. - Provide learners with a PV training kit and commissioning checklist and let them inspect wiring, grounding, and components before documenting whether the system passes commissioning standards. Fault Detection and Correction Activity - The instructor intentionally installs common wiring and grounding faults in a PV training setup, and learners identify and correct these issues using proper commissioning procedures and testing tools. - Ask learners to test the PV system using a multimeter and inspection checklist to locate faults in wiring, grounding, or components and correct them following commissioning procedures.

Week	Learning Competency	Suggested Activities
10	Manage the results of commissioning photovoltaic systems.	Commissioning Report Preparation - Learners analyze the results gathered during system commissioning and prepare a professional commissioning report summarizing test results, system performance, identified issues, and recommended actions. - Provide a commissioning data template and instruct students to organize collected inspection and test results into a formal PV system commissioning report. Commissioning Results Presentation and Evaluation - Learners present their commissioning findings to the class, explain system performance, and propose corrective actions or maintenance recommendations. - Let each group present their commissioning results using charts or slides and justify whether the PV system is ready for operation based on the test outcomes.

Suggested Performance Tasks	• Individual Task: “PV System Commissioning Check” ○ Learners individually perform the basic commissioning procedures of a photovoltaic system, such as checking electrical connections, measuring voltage output, and verifying system readiness while observing proper safety precautions and using appropriate testing tools. ○ Using proper PPE and testing tools, perform a commissioning check on the assigned PV system and record the system’s operational readings and safety observations. • Group Task: “Solar System Start-Up and Commissioning Project” ○ Learners work in groups to carry out the commissioning process of a photovoltaic system, including system inspection, start-up procedures, performance verification, and documentation of safety compliance. ○ In groups, conduct the commissioning and start-up of a PV system, verify system performance, and present a brief commissioning report following safety procedures.
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