



Republic of the Philippines

# Department of Education

DepEd Complex, Meralco Avenue, Pasig City

**STRENGTHENED SENIOR HIGH SCHOOL CURRICULUM**

# **ELECTRICAL INSTALLATION AND MAINTENANCE**

**Grade 11/12**

**Course Description:**

This course equips learners with essential skills for Electrical Installation and Maintenance, focusing on residential and commercial building setups. It covers wiring, maintenance, and systems in compliance with the Philippine Electrical Code for installations up to 600 volts. Upon completion, learners are eligible to take assessments to earn National Certificate level II in Electrical Installation and Maintenance, higher education, and careers relative to the electrical industry sector.

**Elective:** Technical Professional

**Prerequisite:** None

**Time Allotment:** In Grade 11, 320 hours for two semesters, 8 hours per week. In Grade 12, 320 hours for one semester, 16 hours per week

**Schedule:** First/Second Semester

**QUARTER 1**

<b>CONTENT STANDARD</b>	The learners demonstrate an understanding of roughing-in activities for residential/building wiring systems.	
<b>PERFORMANCE STANDARD</b>	The learners perform roughing-in activities for residential/building in accordance with PEC standard.	
<b>LEARNING COMPETENCIES</b>	<b>CONTENT</b>	
1. Explain the overview of Electrical System Installation	Introduction to Electrical System Installation (ESI) <ul style="list-style-type: none"> <li>• Introduction to ESI</li> <li>• PEC standards</li> <li>• Career/Entrepreneurial opportunities</li> </ul>	
2. Discuss the electrical plans, tools and requirements for roughing-in, wiring and cabling works	Electrical Plans <ul style="list-style-type: none"> <li>• Wiring diagram interpretation</li> <li>• Electrical load calculation</li> </ul> Electrical Non-Metallic (PVC, CPC) and Metallic Conduits and Fittings <ul style="list-style-type: none"> <li>• Types</li> <li>• Tools</li> <li>• Bending procedures</li> </ul>	

	Wiring and Cabling Works <ul style="list-style-type: none"> <li>• Wire ways and cable trays</li> <li>• Auxiliary terminal cabinets and distribution panels</li> <li>• Cable pulling requirements</li> </ul>
3. Perform procedures in installing electrical non-metallic and metallic conduits	Non-Metallic and Metallic Conduit Installation Procedures <ul style="list-style-type: none"> <li>• Electrical layout review</li> <li>• Non-metallic conduits (PVC, CPC)</li> <li>• Metallic conduits</li> <li>• Cable trays, terminal cabinets and distribution panels</li> </ul>
4. Perform procedures in electrical cable pulling	Electrical Cable Pulling Procedures <ul style="list-style-type: none"> <li>• Electrical design</li> <li>• Cable pulling contents</li> <li>• Cable length verification</li> <li>• Cable routing</li> <li>• Cable pulling methods</li> </ul>
5. Report completion of work	Documentation and report

## QUARTER 2

<b>CONTENT STANDARD</b>	The learners demonstrate an understanding of the installation and termination of wiring fixtures, as well as the use of protective devices in residential/building wiring systems.
<b>PERFORMANCE STANDARD</b>	The learners perform installation and termination of wiring fixtures, as well as the use of protective devices in residential/building wiring systems according to PEC standard.
<b>LEARNING COMPETENCIES</b>	<b>CONTENT</b>
1. Discuss the protective devices for single-phase distribution	Protective Devices <ul style="list-style-type: none"> <li>• Types (panelboard, circuit breaker, safety switch, GFCI and grounding systems)</li> <li>• Specifications</li> <li>• Applications</li> </ul>

2. Perform procedures in installing electrical protective devices	Installation and Testing Procedures for Protective Devices <ul style="list-style-type: none"> <li>• Panel board</li> <li>• Circuit breaker</li> <li>• Safety switch</li> <li>• GFCI</li> <li>• Grounding systems</li> </ul>
3. Discuss the wiring devices for floor and wall mount orientation	Wiring Devices (lighting fixtures, outlets and switches) <ul style="list-style-type: none"> <li>• Types</li> <li>• Specifications</li> </ul>
4. Perform procedures in installing wiring devices for floor and wall mount orientation	Wiring Devices Installation Procedures <ul style="list-style-type: none"> <li>• Lighting fixtures</li> <li>• Outlets</li> <li>• Switches</li> </ul>
5. Report completion of work	Documentation and report

### QUARTER 3

<b>CONTENT STANDARD</b>	The learners demonstrate an understanding of the concepts and principles of Fire Detection and Alarm Systems (FDAS).	
<b>PERFORMANCE STANDARD</b>	The learners perform installation of Fire Detection and Alarm Systems (FDAS) according to PEC standard.	
	<b>LEARNING COMPETENCIES</b>	<b>CONTENT</b>
1. Discuss the devices and wiring diagrams for FDAS		Fire Detection and Alarm System (FDAS) <ul style="list-style-type: none"> <li>• Input/Output devices</li> <li>• Wiring diagrams</li> </ul>
2. Perform installation procedures for FDAS		FDAS installation and testing procedures
3. Report completion of work		Documentation and report

## QUARTER 4

<b>CONTENT STANDARD</b>	The learners demonstrate an understanding of the concepts and principles of Closed-Circuit Television (CCTV).
<b>PERFORMANCE STANDARD</b>	The learners perform installation of Closed-Circuit Television (CCTV) according to PEC standard.
<b>LEARNING COMPETENCIES</b>	<b>CONTENT</b>
1. Discuss the devices and wiring diagrams for CCTV	Closed-Circuit Television (CCTV) <ul style="list-style-type: none"><li>• Input/Output devices</li><li>• Wiring diagrams</li></ul>
2. Perform installation procedures for CCTV	CCTV installation and testing procedures
3. Report completion of work	Documentation and report

## GLOSSARY

**AC (Alternating Current):** An electric current that reverses direction periodically. It is the type of current delivered to homes and businesses.

**Circuit:** A complete, closed path through which electric current can flow.

**Conductor:** A material that allows the flow of electric current; copper and aluminum are common examples.

**Circuit Breaker:** A safety device that automatically interrupts the electrical flow in a circuit when it detects an overload or short circuit.

**Current (I):** The flow of electric charge, measured in amperes (A).

**DC (Direct Current):** Electric current that flows in one direction only, produced by solar panels.

**Insulation:** Material used to prevent the flow of electricity and protect wires and users from electrical shock.

**Installation:** The process of setting up equipment or systems for operational use.

**Kilowatt (kW):** A unit of power equal to 1,000 watts, used to measure the output of solar panel systems.

**Kilowatt-Hour (kWh):** A unit of energy representing the power consumption of 1 kW for one hour; commonly used to measure electricity usage.

**Load:** The electrical power consumed by a device or system.

**Multimeter:** An instrument that can measure voltage, current, and resistance in an electrical circuit.

**Protection Device:** Safety equipment like circuit breakers, fuses, and surge protectors that safeguard the system against electrical faults.

**Resistance (R):** A measure of the opposition to current flow in a circuit.

**Short Circuit:** A fault that occurs when there is a direct path for current to flow between two points, bypassing the intended path.

**Schematic Diagram:** A simplified representation of an electrical circuit showing the connections between components.

**Switch:** A device used to open or close an electrical circuit, controlling the flow of current.

**Safety Protocols:** Procedures and guidelines established to protect people and equipment from electrical hazards.

**Troubleshooting:** The process of diagnosing and resolving issues within an electrical or electronic system.

**Voltage (V):** The electrical potential difference between two points, measured in volts.

**Watt (W):** The unit of power, equivalent to one joule per second.

**Wire Stripper:** A tool used to remove the insulation from wires for electrical connections.

### TOOLS, MATERIALS, AND EQUIPMENT

TOOLS	MATERIALS	EQUIPMENT
Spirit level	Junction box PVC	Electric drill
Hack saw	#16 G.I wire	Portable grinder
Pipe cutter	Whiteboard 4 x 8 x $\frac{3}{4}$	Gun tucker
Pipe reamer	Whiteboard 4 x 4 x $\frac{3}{4}$ with movable stand	Fire Alarm System (with smoke detector, heat detector, siren/buzzer/bell, strobe light, manual call point)
Pipe threader	Whiteboard marker, assorted color	CCTV System (4-Camera CCTV System)
Pipe bender	Push pins	Labelling machine
Bolt cutter	Pencil sharpener	Workshop table
Ball hammer	Utility box	Fire extinguisher KGS ABC
Electrician pliers	Connectors PVC, $\frac{1}{2}$	LCD Projector
Side cutter	Connectors PVC, $\frac{3}{4}$	Laptop
Screwdrivers set	PVC square box 4 x 4	Workshop table
Box wrench	Flexible conduit $\frac{1}{2}$ ", $\frac{3}{4}$	Fire extinguisher KGS ABC
Wire splicer	PVC Conduit $\frac{1}{2}$ , $\frac{3}{4}$	
Wire stripper	RSC/IMC/EMT	
Electrician knife	Entrance cap	
Tools holster	Locknut & bushing	
Push-pull 0-5 meters	Ground fault current Interrupting device	
Claw hammer	3/16" x 1" Metal Screw	
Prick punch	Conduit strap/clamp	
Safety belt	Wiring boards 3/4ft x 8ft x 8ft	
Heat gun 1200 watts	Floor outlet	
Heavy-duty soldering iron	Working gloves	
Soldering iron (30-60watts)	Safety shoes	
Desoldering tools	Hard hat	
Multi-tester (analog/digital)	Safety goggles	
Earth resistance tester	Wire AWG#12, 3.5mm <sup>2</sup>	
Insulation resistance tester	Wire AWG #14, 2.0mm <sup>2</sup>	
Allen wrench/key	Wire AWG #18, single-core (stranded)	

Flat file smooth 8"	Wood screw ½" x 8	
	Receptacle surface type	
	Receptacle flush type	
	Pipe bender	
	Incandescent bulb 100w 220VAC	
	Convenient outlet 2-gang with plate and cover	

### **REFERENCES**

Technical Education and Skills Development Authority (TESDA). Training Regulations for Electrical Installation and Maintenance NC II (Amended). Promulgated Dec. 16, 2015.

<https://tesda.gov.ph/Downloadables/TR-Electrical%20Installation%20and%20Maintenance%20NC%20II.pdf>

Technical Education and Skills Development Authority (TESDA). Training Regulations for PV Systems Installation NC II.

<https://e-tesda.gov.ph/course/index.php?categoryid=1287>