



NIDA CORPORATION COMPUTER ASSISTED INSTRUCTION

LESSON AND OBJECTIVE LISTING

**Master Course Listing
NEC Code**

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Representative



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OBJECTIVE LISTING - Master Course Listing

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CARDS/KITS

MOD 69 - INTRODUCTION TO RESIDENTIAL WIRING

- 7041-112-130 Electrical Supply Systems and Installations ---
- Describe the three parts of an electrical supply system.
 - Describe typical voltages in an electrical supply system.
 - Describe how electrical wiring information is conveyed to the electrician using symbols and how specifications are used.
 - Describe the agencies that are responsible for establishing electrical codes and standards.
- 7041-112-160 Electrical Symbols and Conductors ---
- Describe outlets and recognize their symbols.
 - Describe switches and recognize their symbols.
 - Describe conductors and recognize their symbols.
 - Recognize miscellaneous symbols.
 - Describe conductors and their sizes and types.
 - Describe the types of conductor insulation.
 - Describe conductor color code.
- 7041-112-190 Electrical Wiring Systems and Boxes ---
- Describe how power is brought into a house and how the protection devices are used.
 - Describe two and three conductor wiring methods.
 - Describe sheathing and conduits and how they are used.
 - Describe electrical boxes and how they are used.
 - Describe how boxes are installed.
 - Describe how boxes are wired for outlets, switches, and connections.
- 7041-112-220 Electrical Switches, Interrupters, and Suppressors ---
- Describe standard 1-pole switch wiring.
 - Describe three-way switch wiring.
 - Describe four-way switch wiring.
 - Describe 2-pole switch wiring.
 - Describe Ground Fault Circuit Interrupters (GFCI).
 - Describe Immersion Detection Circuit Interrupters (IDCI).
 - Describe Transient Voltage Surge Suppressors (TVSS).
 - Describe Isolated Ground Receptacles (IG).
- 7041-112-250 Recessed Lighting and Ballast ---
- Describe the voltages used for residential lighting and the factors to consider before installation.
 - Describe recessed lighting installation.
 - Describe ballasts.
 - Describe ballast installation.
- 7041-112-280 Branch Circuits and Conductor Sizing ---
- Describe how the number of branch circuits is determined.
 - Describe how the number of outlets per branch circuit is determined.
 - Use NEC Table 310-16 to determine allowable amperage of conductors.
 - Describe the de-rating factors and restrictions on amperage for NEC Table 310-16.
- 7041-112-920 Introduction to Residential Wiring Post-Test (Theory) ---

MOD 70 - ROOM BRANCH CIRCUITS

- 7041-114-130 Bedroom and Master Bedroom Circuits ---
- Describe the methods used to group outlets.

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MOD 70 - ROOM BRANCH CIRCUITS (cont.)

- 7041-114-130 Bedroom and Master Bedroom Circuits (cont.)
- Describe the general wiring methods for bedrooms and how receptacles are placed.
 - Describe how lighting fixtures are used in closets to meet NEC requirements.
 - Describe the general wiring methods for master bedrooms.
 - Describe the use of two circuit receptacles.
 - Describe NEC requirements for paddle fans.
- 7041-114-160 Bathroom, Hallway, Front Porch, and Entry Circuits ---
- Define a bathroom according to the NEC.
 - Describe the wiring of receptacles in bathrooms.
 - Describe the lighting requirements in bathrooms.
 - Describe equipment grounding requirements in bathrooms.
 - Describe hallway circuits including three-way switches.
 - Describe front porch and entry.
- 7041-114-190 Kitchen, Dining, and Living Room Circuits ---
- Describe receptacle requirements for small appliance circuits in kitchens, dining rooms, breakfast rooms, and pantries.
 - Describe split circuit applications used in kitchens.
 - Describe lighting requirements in dining rooms.
 - Describe equipment grounding requirements in dining rooms.
 - Describe receptacle requirements in living rooms.
 - Describe lighting requirements in living rooms.
 - Describe the use of track lighting and dimmer controls used in living rooms.
- 7041-114-220 Laundry, Study, Rear Entry, and Attic Circuits ---
- Describe receptacle and lighting requirements for laundry rooms.
 - Describe electric dryer connection methods to include circuit sizing.
 - Describe electric dryer frame grounding requirements.
 - Describe receptacle and lighting requirements for study rooms to include valance lighting and the use of surge protectors.
 - Describe receptacle and lighting requirements for rear entries.
 - Describe receptacle and lighting requirements for attics (including crawl spaces, rooftops, and equipment rooms).
- 7041-114-250 Family Room and Garage Circuits ---
- Describe receptacle and lighting requirements for family rooms.
 - Describe the use and precautions for multi-wire circuits.
 - Describe receptacle and lighting requirements for garage circuits.
 - Describe the use and NEC regulations for outdoor outlets and wiring.
- 7041-114-280 Workshop and Basement Circuits ---
- Describe receptacle and lighting requirements for workshops.
 - Describe the use of multi-outlet assemblies.
 - Describe receptacle and lighting requirements for basements.
- 7041-114-920 Room Branch Circuits Post-Test (Theory) ---

MOD 71 - SPECIAL PURPOSE BRANCH CIRCUITS

- 7041-116-130 Water Pump and Water Heater Circuits ---
- Describe the operation of jet pumps and submersible pumps.
 - Describe wiring for jet pumps and submersible pumps.

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MOD 71 - SPECIAL PURPOSE BRANCH CIRCUITS (cont.)

7041-116-130	Water Pump and Water Heater Circuits (cont.)	
	<ul style="list-style-type: none"> Describe conductor and overcurrent device sizing for jet pumps and submersible pumps. Describe the operation of water heaters. Describe wiring for water heaters. Describe conductor and overcurrent device sizing for water heaters. 	
7041-116-160	Large Kitchen Appliance Circuits	---
	<ul style="list-style-type: none"> Describe the operation of ovens and stoves. Describe the wiring of ovens and stoves. Describe conductor and overcurrent device sizing for ovens and stoves. Describe the operation of food waste disposers and dishwashers. Describe the wiring for food waste disposers and dishwashers. Describe conductor and overcurrent device sizing for food waste disposers and dishwashers. 	
7041-116-190	Vent Fans and Hydromassage Tub Circuits	---
	<ul style="list-style-type: none"> Describe vent fan operation. Describe the wiring of vent fans. Describe conductor and overcurrent device sizing for vent fans. Describe hydromassage tub operation. Describe the wiring for hydromassage tubs. Describe conductor and overcurrent device sizing for hydromassage tubs. 	
7041-116-220	Electric Heating and Air Conditioning	---
	<ul style="list-style-type: none"> Describe the operation of electric heaters. Describe the wiring of electric heating systems. Describe the operation of air conditioner systems. Describe the wiring of air conditioner systems. 	
7041-116-250	Oil and Gas Heating & Heat and Smoke Detectors	---
	<ul style="list-style-type: none"> Describe the operation of oil and gas heaters. Describe the wiring of oil and gas heater systems. Describe the operation of heat/smoke detectors. Describe the wiring of heat/smoke detector systems. 	
7041-116-280	Television and Telephone Systems	---
	<ul style="list-style-type: none"> Identify the different types of television signal sources. Describe the wiring of television systems. Understand the needs of telephone wiring. Describe the wiring of telephone systems. 	
7041-116-310	Service Entrance Equipment and Calculations	---
	<ul style="list-style-type: none"> Understand the needs for service entrance equipment. Describe the wiring of service entrance equipment. Understand the purpose of service entrance calculations. Perform service entrance calculations. 	
7041-116-340	Swimming Pool and Spa Wiring	---
	<ul style="list-style-type: none"> Understand the dangers of wiring swimming pool equipment. Describe the wiring of swimming pool equipment. Understand the danger of wiring spa equipment. Describe the wiring of spa equipment. 	
7041-116-920	Special Purpose Branch Circuits Post-Test (Theory)	---

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MOD 72 - INTRODUCTION TO BASIC SYSTEMS

7211-112-130 Systems Familiarization ST-101 Set

- Describe component thinking.
- Describe systems thinking.
- Compare component thinking to systems thinking.
- Define structure, interconnectivity, and behavior.
- Define input, process, and output.
- Use systems thinking approach on a trailer with electric brakes connected to an automotive vehicle.
- Show how to reduce a system to the subprocesses and modules used to produce certain outputs within the output function.
- Set up a system.
- Follow setup instructions.
- Initialize, align, and operate a system.
- Perform a system E-Stop.
- Perform a system restart.
- Perform a system shutdown.

7211-112-160 Systems Safety ---

- Define a hazard.
- Identify a hazard as physical, chemical, ergonomic, radiation, psychological, or biological.
- Perform a safety risk assessment.
- Apply the hierarchy of risk controls.
- Select the correct fire extinguisher to put out a class A, B, C, D, and combination fires.
- Read emergency evacuation route diagrams.
- Practice standard safety rules while working around and with electricity.
- Correlate OSHA safety code colors used in manufacturing to situations and devices.
- Read material safety data sheets (MSDS).
- Implement the 5-point eye safety checklist.
- Recognize the hazards of confined spaces.

7211-112-190 Multimeter Familiarization ST-101 Set

- Define a digital multimeter's purpose.
- Identify quantities measured with a digital multimeter.
- Identify the sections of a digital multimeter.
- List the IEC Measurement Categories.
- List safe measurement techniques.
- Set up a DMM to measure DC and AC voltages.
- Measure and read DC and AC voltages.
- Apply safe voltage measurement techniques.
- Set up a DMM to measure resistance.
- Measure and read resistance.
- Set up a DMM to measure continuity.
- Measure and read continuity.
- Apply safe resistance and continuity measurement techniques.

7211-112-220 Oscilloscope Familiarization ST-101 Set

- Define the purpose of an oscilloscope.
- Identify quantities measured with an oscilloscope.
- Identify the sections of an oscilloscope.
- Set up an oscilloscope.

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MOD 72 - INTRODUCTION TO BASIC SYSTEMS (cont.)

7211-112-220 Oscilloscope Familiarization (cont.)

- Zero a trace.
- Perform probe compensation.
- Use an oscilloscope to measure waveforms for determining DC voltage, AC voltage (V_{pk} and V_{pp}), and period.
- Calculate frequency, V_{rms} , phase, and pulse width using an oscilloscope.
- Define and measure duty cycle.

7211-114-130 System Input and Output Functions ST-101 Set

- Define the system input function.
- Identify system inputs.
- Define the system output function.
- Identify system outputs.
- Using HMI input controls, perform input functions on a motor system.
- Verify inputs using visual displays and a multimeter.
- Operate and observe the output functions on a motor system.
- Verify outputs using visual displays and a multimeter.

7211-114-160 Instrumentation ST-101 Set

- Define a sensor.
- Describe sensor applications.
- Identify sensor devices.
- Define an actuator.
- Describe actuator process conversion.
- Identify actuator devices.
- Describe what sensor(s) correspond to the function of an actuator.
- Trace sensor and actuator connections using a composite diagram.
- Verify normal operation of a position sensor using displays, monitors, and a multimeter.

7211-114-190 System Process Function ST-101 Set

- Identify the system process function and process control.
- Define feedback loop.
- Describe the types and uses of feedback.
- Define and compare vicious cycle and virtuous cycle.
- Describe the reaction of the process function to various system inputs.
- Use a block diagram to describe the sequence of actions that take place in a control loop.
- Define and compare open loop control and closed loop control.
- Describe the functions of hysteresis and deadband as they relate to process control.
- Identify logic (sequential) control and linear control.
- Define and compare PLCs and PACs.
- Operate and observe the process function of a motor system.
- Using HMI inputs, control the rotational characteristics of a motor system.
- Verify processes using system visual displays, an oscilloscope, and a multimeter.

7211-114-220 Systems Thinking Applications ST-101 Set

- Use a vehicle cruise control system to explain how negative feedback controls a process to maintain proper speed of the vehicle.
- Use a 2-axis motor control system to explain how vertical motion can be combined with horizontal motion.
- Observe the operation of a motor system's process control to regulate the rotational power output of the system.

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MOD 72 - INTRODUCTION TO BASIC SYSTEMS (cont.)

7211-114-220 Systems Thinking Applications (cont.)

- Use HMI inputs to simulate motor loading.
- Measure motor system signals with an oscilloscope.
- Analyze the relationship of measured signals (digital pulses) and rpm of the motor system.

7211-116-160 System Maintenance and Diagnostics ST-101 Set

- Recognize typical preventive, scheduled, and unscheduled maintenance routines.
- Describe general inspection techniques for systems maintenance.
- Recognize system unscheduled maintenance routines.
- Describe when unscheduled maintenance is necessary.
- Set up and initialize a system following a given procedure.
- Perform a system operational check.
- Show proper use of measurement devices.
- Examine basic systems fault isolation procedures.
- Demonstrate the ability to diagnose a defective subsystem using fault isolation procedures.

7211-116-190 System Malfunctions and Troubleshooting ST-101 Set

- Examine the systems troubleshooting process.
- Set up and initialize a system following a given procedure.
- Validate system operation using sensors, displays, and monitoring devices.
- Verify symptoms of subsystem malfunctions.
- Use a digital multimeter and oscilloscope to take measurements.
- Troubleshoot malfunctioning subsystems in a system.

MOD 73 - HOME ENERGY SYSTEMS

7231-112-130 Introduction to Renewable Energy Systems ---

- Express the need for renewable energy.
- Explain the four interdependent elements of renewable energy systems.
- Understand renewable energy sources.
- Describe energy conversion technologies.

7231-112-160 Energy Sources and Site Surveys ---

- Describe renewable energy resources (wind, solar, hydroelectric, ocean wave, ocean tidal, ocean current, ocean thermal conversion, geothermal).
- Illustrate energy resources (wind, solar).
- Explain the use of a site survey.
- Describe how to perform a site survey.

7231-114-130 Home Solar Energy System Fundamentals ES-101 Set

- Explain home solar energy operation.
- Describe solar resources and their uses for home energy.
- Recognize safe home solar energy maintenance methods.
- Recognize home solar energy common tools.
- Read a home solar energy block diagram to identify the major subsystems.
- Operate a home solar energy system using a block diagram.
- Verify the operation of the home solar energy system using sensors, monitors and display devices.
- Examine the operation of the home solar energy system.

7231-114-160 Home Wind Energy System Fundamentals ES-101 Set

- Explain home wind energy operation.

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MOD 73 - HOME ENERGY SYSTEMS (cont.)

7231-114-160 Home Wind Energy System Fundamentals (cont.)

- Describe the effects of wind speed and wind obstructions.
- Describe tilt-up tower operation.
- Recognize safe home wind energy maintenance methods.
- Recognize home wind energy common tools.
- Read a home wind energy block diagram to identify the major subsystems.
- Operate a home wind energy system using a block diagram.
- Verify the operation of the home wind energy system using sensors, monitors and display devices.
- Examine the operation of a home wind energy system.

7231-114-190 Home Hybrid Energy System Fundamentals ES-101 Set

- Explain home backup power generation.
- Explain home inverter and grid-tied interface operation.
- Describe hybrid home energy system integration.
- Recognize safe home hybrid energy maintenance methods.
- Recognize home hybrid energy common tools.
- Read a home hybrid energy block diagram to identify the major subsystems.
- Operate a home hybrid energy system using a block diagram.
- Verify the operation of the home hybrid energy system using sensors, monitors, and display devices.
- Examine the operation of each home hybrid energy subsystem.

7231-114-220 Home Energy System Maintenance and Diagnostics ES-101 Set

- Recognize typical home energy preventive, scheduled, and unscheduled maintenance routines.
- Describe general inspection techniques for home energy systems.
- Recognize unscheduled maintenance routines.
- Describe when unscheduled maintenance is necessary.
- Set up and initialize a home energy system following a given procedure.
- Perform a home energy operational check.
- Show proper use of measurement devices.
- Examine home energy system fault isolation procedures.
- Demonstrate the ability to diagnose a defective subsystem in a home energy system using fault isolation procedures.

7231-114-250 Home Energy System Malfunctions and Troubleshooting ES-101 Set

- Examine the troubleshooting process for home energy systems.
- Describe the basic tools used to troubleshoot home energy systems.
- Set up and initialize a home energy system following a given procedure.
- Validate system operation using sensors, displays, and monitoring devices.
- Verify symptoms of home energy subsystem malfunctions.
- Use a digital multimeter to take measurements.
- Troubleshoot malfunctioning subsystems in a home energy system.

7231-114-920 Home Energy Systems Post-Test (Theory) ---

MOD 74 - COMMERCIAL WIND ENERGY SYSTEMS

7231-112-130 Introduction to Renewable Energy Systems ---

- Express the need for renewable energy.

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MOD 74 - COMMERCIAL WIND ENERGY SYSTEMS (cont.)

7231-112-130 Introduction to Renewable Energy Systems (cont.)

- Explain the four interdependent elements of renewable energy systems.
- Understand renewable energy sources.
- Describe energy conversion technologies.

7231-112-160 Energy Sources and Site Surveys ---

- Describe renewable energy resources (wind, solar, hydroelectric, ocean wave, ocean tidal, ocean current, ocean thermal conversion, geothermal).
- Illustrate energy resources (wind, solar).
- Explain the use of a site survey.
- Describe how to perform a site survey.

7231-116-130 Wind Turbine System Fundamentals ES-101 Set

- Describe the types of wind turbines (HAWT and VAWT).
- Describe the differences between commercial and residential wind generation.
- Recognize safe wind turbine maintenance methods.
- Explain commercial wind power subsystem operation (generator, gearing, cooling, control, yaw, pitch, brake).
- Read a wind turbine block diagram to identify major subsystems.
- Set up and initialize a wind turbine system following a given procedure.
- Operate a wind turbine system using a block diagram.
- Verify the operation of a wind turbine system using sensors, monitors, and display devices.
- Examine the operation of each wind turbine subsystem.

7231-116-160 3-Phase Power Fundamentals ES-101 Set

- Describe 3-phase power.
- Describe the operation of an AC generator.
- Describe the operation of inverters.
- Describe the difference between 50 Hz and 60 Hz power.
- Read a wind turbine block diagram.
- Operate a wind turbine system using a block diagram.
- Verify the presence of 3-phase power using an oscilloscope.

7231-116-190 Wind Turbine System Maintenance and Diagnostics ES-101 Set

- Recognize wind turbine preventive/scheduled and unscheduled maintenance routines.
- Describe physical inspection techniques for a wind turbine system.
- Recognize unscheduled maintenance routines.
- Describe when unscheduled maintenance is necessary.
- Set up and initialize a wind turbine system following a given procedure.
- Perform a wind turbine system operational check.
- Show proper use of measurement devices.
- Examine wind turbine system fault isolation procedures.
- Demonstrate the ability to diagnose a defective subsystem in a wind turbine system using fault isolation procedures.

7231-116-220 Wind Turbine System Malfunctions and Troubleshooting ES-101 Set

- Examine the troubleshooting process for wind turbine systems.
- Describe the basic tools used to troubleshoot commercial wind turbine systems.
- Initialize a wind turbine system.
- Validate a wind turbine system operation.
- Recognize symptoms of wind turbine subsystem malfunctions.
- Use a digital multimeter and oscilloscope to take measurements.

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MOD 74 - COMMERCIAL WIND ENERGY SYSTEMS (cont.)

7231-116-220 Wind Turbine System Malfunctions and Troubleshooting (cont.)

- Identify a malfunctioning subsystem in a wind turbine power system.

7231-116-920 Commercial Wind Energy Systems Post-Test (Theory) ---

MOD 75 - COMMERCIAL SOLAR ENERGY SYSTEMS

7231-112-130 Introduction to Renewable Energy Systems ---

- Express the need for renewable energy.
- Explain the four interdependent elements of renewable energy systems.
- Understand renewable energy sources.
- Describe energy conversion technologies.

7231-112-160 Energy Sources and Site Surveys ---

- Describe renewable energy resources (wind, solar, hydroelectric, ocean wave, ocean tidal, ocean current, ocean thermal conversion, geothermal).
- Illustrate energy resources (wind, solar).
- Explain the use of a site survey.
- Describe how to perform a site survey.

7231-118-130 Solar Thermal System Fundamentals ---

- Express the need for solar thermal power as a renewable energy.
- Differentiate non-concentrating and concentrating thermal collectors.
- Explain the three main classes of solar thermal collectors.
- Examine solar pool heating systems.
- Examine solar water heating systems.
- Examine solar space heating systems.
- Examine parabolic trough systems.
- Examine solar dish (Stirling engine) systems.
- Examine solar power tower systems.

7231-118-160 Solar Photovoltaic System Fundamentals ES-101 Set

- Express the need for solar photovoltaic power as a renewable energy.
- Explain the photovoltaic (PV) effect and construction.
- Describe solar resources.
- Describe general solar photovoltaic personal protective equipment.
- Explain proper installation procedures.
- Recognize safe installation and maintenance methods.
- Recognize solar PV system common tools.
- Read a solar photovoltaic system block diagram to identify the major subsystems.
- Set up and initialize a solar PV system following a given procedure.
- Operate a solar photovoltaic system using a block diagram.
- Verify the operation of a solar photovoltaic system using sensors, monitors, and display devices.
- Examine the operation of each solar photovoltaic subsystem.

7231-118-190 Solar Photovoltaic System Maintenance and Diagnostics ES-101 Set

- Recognize solar photovoltaic preventive/scheduled and unscheduled maintenance routines.
- Describe physical inspection techniques for solar photovoltaic systems.
- Recognize unscheduled maintenance routines.
- Describe when unscheduled maintenance is necessary.
- Set up and initialize a solar PV system following a given procedure.

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MOD 75 - COMMERCIAL SOLAR ENERGY SYSTEMS (cont.)

7231-118-190 Solar Photovoltaic System Maintenance and Diagnostics (cont.)

- Perform a solar photovoltaic system operational check.
- Show proper use of measurement devices.
- Examine solar photovoltaic system fault isolation procedures.
- Demonstrate the ability to diagnose a defective subsystem in a solar photovoltaic system using fault isolation procedures.

7231-118-220 Solar Photovoltaic System Malfunctions and Troubleshooting ES-101 Set

- Examine the troubleshooting process for solar photovoltaic systems.
- Describe the basic tools used to troubleshoot solar photovoltaic systems.
- Set up and initialize a solar PV system following a given procedure.
- Validate system operation using sensors, displays, and monitoring devices.
- Verify symptoms of solar photovoltaic subsystem malfunctions.
- Use a digital multimeter and oscilloscope to take measurements.
- Troubleshoot malfunctioning subsystems in a solar photovoltaic system.

7231-118-920 Commercial Solar Energy Systems Post-Test (Theory) ---



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