



**NIDA CORPORATION  
COMPUTER ASSISTED INSTRUCTION**

**LESSON AND OBJECTIVE LISTING**

**Master Course Listing  
NEC Code**

**2018-08-30**



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**OBJECTIVE LISTING - Master Course Listing**

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### **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.)
  - 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 ..... ---
  - 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 ..... ---
  - 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 ..... ---
  - 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 ..... ---
  - 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 ..... ---
  - 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 ..... ---
  - 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 ..... ---
  - 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 (Vpk and Vpp), and period.
- Calculate frequency, Vrms, 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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