

# Core Curriculum

## 4th Year Syllabus

None



## Core Curriculum: Course Selection Per Year

4th Year Core	
Orientation, Level III - 2nd Ed.	1
Code, Standards, and Practices 5, Based on the 2023 NEC - CML	2
Torque for the Electrical Industry - CML	1
Code, Standards, and Practices 4, Based on the 2023 NEC - CML	1.5
Motors, Level I - 2nd Ed.	0.5
Motors, Level II, Based on the 2020 NEC - 2nd Ed.	1.5
Motor Control for Electricians - CML	7
Electrical Code Calculations, Level II, Based on the 2020 NEC	1
Photovoltaic Systems Workbook SW	3
Motors, Level III - 2nd Ed.	2
Digital Electronics, Level I	5
Distributed Generation, Level I	0.5

## Core Curriculum: 4th Year Core Courses

	Credits	Page	Date
<b>Orientation, Level III - 2nd Ed.</b>			
J200LM.I3a	1.0	1	
<b>Code, Standards, and Practices 5, Based on the 2023 NEC - CML</b>			
J235LM.N	2.0	2	
<b>Torque for the Electrical Industry - CML</b>			
J242LM.A	1.0	2	
<b>Code, Standards, and Practices 4, Based on the 2023 NEC - CML</b>			
J234LM.N	1.5	3	
<b>Motors, Level I - 2nd Ed.</b>			
J206LM.J1	0.5	3	
<b>Motors, Level II, Based on the 2020 NEC - 2nd Ed.</b>			
J206LM.J2_20	1.5	4	
<b>Motor Control for Electricians - CML</b>			
J209LM.I1	7.0	5	
<b>Electrical Code Calculations, Level II, Based on the 2020 NEC</b>			
J227LM.L2	1.0	6	
<b>Photovoltaic Systems Workbook SW</b>			
≡ J230SW.J	3.0	7	
<b>Motors, Level III - 2nd Ed.</b>			
J206LM.J3	2.0	8	
<b>Digital Electronics, Level I</b>			
J240LM.I1	5.0	9	

# Core Curriculum: 4th Year Core Courses

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	Credits	Page	Date
<b>Distributed Generation, Level I</b>			
J229LM.I1	0.5	10	



## Core Curriculum: Course Level and Credit Summary

### ***Orientation, Level III - 2nd Ed.***

Item Code: J200LM.I3a

Core Curriculum Year: 4

Core Credits

Advanced Credits

1.0

*Course Prerequisite(s): None*

*Other Prerequisites: None*

*Required Material(s):*

- Lesson 1 The National Electrical Benefit Fund (NEBF)
- Lesson 2 After Apprenticeship
- Lesson 3 Soon To Be A Journey-Level Worker
- Lesson 4 This is a National Program
- Lesson 5 Keys to Success-Motivation and Leadership
- Lesson 6 The National Labor Relations Board
- Lesson 7 The Economics of Unemployment
- Lesson 8 The Realities of Construction

### ***Code, Standards, and Practices 5, Based on the 2023 NEC - CML***

Item Code: J235LM.N

Core Curriculum Year: 4

Core Credits

Advanced Credits

2.0

*Course Prerequisite(s): Code, Standards, and Practices 4*

*Other Prerequisites: None*

*Required Material(s):*

• ***National Electrical Code - 2023 (S1150)***

- Lesson 1 Installing Electrical Services
- Lesson 2 Swimming Pools, Fountains, and Similar Installations
- Lesson 3 Understanding Emergency and Standby Systems Installation Requirements
- Lesson 4 Over 1,000-Volt Installations
- Lesson 5 Remote-Control, Signaling, and Power-Limited Circuits

## Core Curriculum: Course Level and Credit Summary

### ***Torque for the Electrical Industry - CML***

Item Code: J242LM.A

Core Curriculum Year: 4

Core Credits

Advanced Credits

1.0

*Course Prerequisite(s): None*

*Other Prerequisites: None*

*Required Material(s):*

- Lesson 1 Torque Theory
- Lesson 2 Hardware—Threaded Fasteners, Bolts, Nuts, and Washers
- Lesson 3 Torque Wrenches and Their Uses
- Lesson 4 Torque Tightening
- Lesson 5 Electrical Torque Applied
- Lesson 6 Resources
- Lesson 7 Support - Labs
- Lesson 8 Final Torque Assessment

### ***Code, Standards, and Practices 4, Based on the 2023 NEC - CML***

Item Code: J234LM.N

Core Curriculum Year: 4

Core Credits

Advanced Credits

1.5

*Course Prerequisite(s): Code, Standards, and Practices 3*

*Other Prerequisites: None*

*Required Material(s):*

- *National Electrical Code - 2023 (S1150)*
- *Electrical Systems Textbook (S1170)*

- Lesson 1 Special Occupancies
- Lesson 2 Electrical Equipment
- Lesson 3 Special Equipment
- Lesson 4 Introduction to Cable Tray Systems
- Lesson 5 Installing Surface Metal Raceway

## Core Curriculum: Course Level and Credit Summary

### ***Motors, Level I - 2nd Ed.***

Item Code: J206LM.J1

Core Curriculum Year: 4

Core Credits

Advanced Credits

0.5

*Course Prerequisite(s): AC Theory, Level I/II; Code and Practices 3, Level I*

*Other Prerequisites: None*

*Required Material(s):*

- *Motors Textbook (S649)*

Lesson 1 Magnetism and Induction  
Lesson 2 Motor Nameplates  
Lesson 3 AC Alternators  
Lesson 4 Three-Phase Motors  
Lesson 5 Squirrel-Cage Motors

# Core Curriculum: Course Level and Credit Summary

## ***Motors, Level II, Based on the 2020 NEC - 2nd Ed.***

Item Code: J206LM.J2\_20

Core Curriculum Year: 4

Core Credits

Advanced Credits

1.5

***Course Prerequisite(s): Motors, Level I - 2nd Ed.***

***Other Prerequisites: None***

***Required Material(s):***

- ***Motors Textbook (S649)***
- ***National Electrical Code - 2020 (S1050)***
- ***Code Calculations Textbook - 2020 (S00820)***

- Lesson 1 Wound-Rotor Motors
- Lesson 2 Single-Phase Motors
- Lesson 3 Motor Protection
- Lesson 4 DC Motors and Generators
- Lesson 5 Starting
- Lesson 6 Motor Branch Circuits
- Lesson 7 Motor Branch-Circuit Protection
- Lesson 8 Motor Overload Protection
- Lesson 9 Sizing Motor Disconnect

# Core Curriculum: Course Level and Credit Summary

## ***Motor Control for Electricians - CML***

Item Code: J209LM.I1

Core Curriculum Year: 4

Core Credits

Advanced Credits

7.0

***Course Prerequisite(s): Motors, Level I/II***

***Other Prerequisites: None***

***Required Material(s):***

**• Fundamentals of Motor Control (S547)**

- Lesson 1 Introduction to Motor Control and the Industry
- Lesson 2 Electrical Safety with Motor Controls
- Lesson 3 Symbols, Diagrams, Drawings, and Logic
- Lesson 4 Input and Output Devices
- Lesson 5 Solenoids and Control Relays
- Lesson 6 Control Transformers
- Lesson 7 Motor Control Centers, Contactors, and Motor Starters
- Lesson 8 Timing and Counting Devices
- Lesson 9 Solid-State Devices
- Lesson 10 Programmable Controllers
- Lesson 11 Motor Drives
- Lesson 12 Industrial Networks
- Lesson 13 System-Wide Troubleshooting
- Lesson 14 Resources
- Lesson 15 Support - Labs
- Lesson 16 REMOVED - 1-4-2024 - PRM

## Core Curriculum: Course Level and Credit Summary

### ***Electrical Code Calculations, Level II, Based on the 2020 NEC***

Item Code: J227LM.L2

Core Curriculum Year: 4

Core Credits

Advanced Credits

1.0

***Course Prerequisite(s): Elect. Code Calc., Lvl I or FCC CML***

***Other Prerequisites: None***

***Required Material(s):***

• *National Electrical Code - 2020 (S1050)*

• *Code Calculations Textbook - 2020 (S00820)*

Lesson 1 Calculating Voltage Drop in Feeders and Branch Circuits

Lesson 2 Introduction to Electrical Load Calculations

Lesson 3 Range and Appliance Calculations


Lesson 4 Calculating the Parameters of Residential Loads in Accordance with the *NEC*

Lesson 5 Calculating the Parameters of Multifamily Dwelling Loads in Accordance with the *NEC*

Lesson 6 Calculating the Parameters of Commercial Loads in Accordance with the *NEC*

# Core Curriculum: Course Level and Credit Summary

## **Photovoltaic Systems Workbook SW**

 Item Code: J230SW.J

Core Curriculum Year: Advanced

Core Credits

Advanced Credits

3.0

*Course Prerequisite(s): None*

*Other Prerequisites: None*

*Required Material(s):*

- *Photovoltaic Systems Textbook, 3rd Ed. (S674)*

Lesson 1	Introduction to Photovoltaic Systems
Lesson 2	Fundamentals of Solar Radiation
Lesson 3	Sun-Earth Relationships
Lesson 4	Solar Radiation Data and Measurements
Lesson 5	Site Surveys and Planning
Lesson 6	Photovoltaic Systems and Components
Lesson 7	Fundamentals of Photovoltaic Devices
Lesson 8	Photovoltaic Modules and Arrays
Lesson 9	Batteries
Lesson 10	Charge Controllers
Lesson 11	Inverters
Lesson 12	System Sizing
Lesson 13	Mechanical Integration
Lesson 14	Electrical Integration I
Lesson 15	Electrical Integration II
Lesson 16	Utility Interconnection
Lesson 17	Permitting and Inspection
Lesson 18	Commissioning, Maintenance, and Troubleshooting
Lesson 19	Economic Analysis

## Core Curriculum: Course Level and Credit Summary

### ***Motors, Level III - 2nd Ed.***

Item Code: J206LM.J3

Core Curriculum Year: Advanced

Core Credits

Advanced Credits

2.0

***Course Prerequisite(s): Motors, Level I/II***

***Other Prerequisites: None***

***Required Material(s):***

- ***Motors Textbook (S649)***

Lesson 1	Synchronous Motors
Lesson 2	Braking
Lesson 3	Multispeed Motors
Lesson 4	Adjustable-Speed Drives
Lesson 5	Bearings
Lesson 6	Drive Systems and Clutches
Lesson 7	Motor Alignment
Lesson 8	Troubleshooting Motors
Lesson 9	Special-Application Motors



## Core Curriculum: Course Level and Credit Summary

### **Digital Electronics, Level I**

Item Code: J240LM.I1

Core Curriculum Year: Advanced

Core Credits

Advanced Credits

5.0

*Course Prerequisite(s): DC Theory, Level I/IV*

*Other Prerequisites: None*

*Required Material(s):*

- |          |                                     |
|----------|-------------------------------------|
| Lesson 1 | Introduction to Digital Electronics |
| Lesson 2 | Introduction to Boolean Algebra     |
| Lesson 3 | AND Logic                           |
| Lesson 4 | OR Logic                            |
| Lesson 5 | BUFFER and INVERTER Amplifiers      |
| Lesson 6 | NAND and NOR Logic                  |
| Lesson 7 | XOR and XNOR Logic                  |
| Lesson 8 | Debouncing Circuits                 |

### **Distributed Generation, Level I**

Item Code: J229LM.I1

Core Curriculum Year: Advanced

Core Credits

Advanced Credits

0.5

*Course Prerequisite(s): AC Theory, Level II/III*

*Other Prerequisites: None*

*Required Material(s):*

- |          |   |
|----------|---|
| Lesson 1 | Information Technology Sites and Critical Loads |
| Lesson 2 | UPS — Uninterruptible Power Supplies            |
| Lesson 3 | Infrastructure Components                       |
| Lesson 4 | Critical UPS Systems Design Configurations      |
| Lesson 5 | UPS Installation                                |
| Lesson 6 | Critical Systems Service                        |
| Lesson 7 | Fuel Cell Basics and Applications               |
| Lesson 8 | Fuel Cell Installation                          |